DOCUMENT RESUME

ED 193 062 SE 032 964

AUTHOR Brennan, Matthew J.
TITLE Energy and My Environment: K-6 Teachers' Guide. Draft.
INSTITUTION Governor's Energy Office, Tallahassee, Fla.
SPONS AGENCY Florida State Dept. of Education, Tallahassee. Office of Environment Education.
PUB DATE Nov 79
NOTE 142p.: For related document, see SE 032 965. Contains occasional light and broken type.

EDRS PRICE MF01/PC06 Plus Postage.
DESCRIPTORS Elementary Education; *Elementary School Science; *Energy; Energy Conservation; *Environmental Education; *Resource Materials; Science Education; Social Studies
IDENTIFIERS *Energy Education

ABSTRACT

One hundred energy education activities comprise this manual for elementary school teachers. Two or three lessons, which deal with each of seven energy-related conceptual schemes, are provided for every grade level. These experience-oriented activities emphasize questions, observations, and class discussion. Lesson plans include directions for introducing and developing the activity, suggestions for extending the learning experience, and a listing of the lesson's concept and objective. (WB)

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ENERGY *and* MY ENVIRONMENT

K - 6 TEACHERS' GUIDE

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PUBLISHED BY:
GOVERNOR'S ENERGY OFFICE
STATE OF FLORIDA
NOVEMBER 1979

SE 032 964

ENERGY AND MY ENVIRONMENT

K-6 TEACHERS' GUIDE

Written by:
Dr. Matthew J. Brennan

This public document was promulgated by the Governor's Energy Office, using U. S. Department of Energy grant funds, at a cost of $787.00 or $1.75 per copy. Its purpose is to provide instructional material to promote energy conservation education in Florida schools.

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Printed by:

Governor's Energy Office
The Capitol
Tallahassee, FL 32301
(904) 488-6143

FOREWORD

This Kindergarten through Grade Six teachers' guide is the first of a series entitled ENERGY AND MY ENVIRONMENT. A second volume for teachers of Grades Seven through Nine is now available and a third volume has been written for teachers of subjects in Grades Ten through Twelve. Final draft publication of the complete series should occur in June, 1980.

After participating in many curriculum development and educational planning projects, the editors recognized one element which permeates those which were most successful. That element is the establishment of major ideas which serve as recurring themes throughout the child's educational experiences. This publication is designed to integrate key energy and energy conservation ideas in just such a manner.

The State of Florida was most fortunate indeed in obtaining the services of Dr. Matthew J. Brennan as the author of this series of teachers' guides. His work as editor on the PEOPLE AND THEIR ENVIRONMENT series established him as one of the founders and principal practioners of this cognitive theme approach.

These materials are designed to provide the flexibility which any good teacher demands, yet provide the recurring themes which may well be essential if the lessons are to have any lasting impact on the student. These materials can play an important role in the development of a citizenry which thinks and acts on a basis of factual knowledge of key energy concepts, yet also possess an understanding of the great national and international web of energy relationships and interdependencies important for the citizen of today and essential for the citizens of the future.

The Editors

EDUCATION

IS THE KEY

Introduction - To The Teacher

Is there an "energy crisis"? There has always been an energy crisis, as humans struggled to survive on planet earth. Now we face a new energy crisis - a crisis related to the future supply of the fossil fuels on which our civilization depends. This new energy crisis provides unlimited possibilities for student activities which will help children learn about the earth, and how the use of energy has shaped civilizations of the past and present, and how it will determine the civilizations of the future.

Through their use of energy, humans have radically changed the environment. Now we must face the consequences of these changes, not only on the environment, but on all of life, including our own; on our societies; our economies; on the air we breathe and the water we drink; on the life-styles we lead; on the quality of the environment; and on the lives of the animals with whom we share the earth. The changes were made by people. The problems they have created can only be solved by people - indeed, by people who wish to solve them.

So we have reached the "crisis". The fossil fuels which gave us unlimited supplies of cheap energy are being rapidly depleted. The time for decision has arrived. How will we answer? We have the technology to solve most of the energy-related problems of the earth environment. Whether we solve these problems will depend on how clearly they are recognized and whether our values will demand their solution. It is hoped that the activities in this guide will help students to understand the scientific, social, and aesthetic alternatives which must be considered.

The activities have been organized around the seven major conceptual schemes relating to energy, with a Unit at each grade level for each one of the conceptual schemes. In addition, there is a lesson concept for each lesson to help the teacher coordinate the activities with other areas of the curriculum. Each lesson is designed to suggest some activity, with the emphasis on "suggest", because students will be free to interpret each activity suggestion as they will.

You will have many ideas for variation and improvement of the lessons suggested. Let the State Energy Office know of these so that future revisions of this guide will better serve the needs of teachers in this rapidly changing area of education.

ENERGY POLICY FOR FLORIDA

WHEREAS, energy availability strongly impacts upon every aspect of human existence and the conservation of energy resources is essential to the health, safety, and welfare of the people of this state and to the well-being of the state economy, and

WHEREAS, Florida is particularly dependent upon other states and nations to supply its energy needs, and

WHEREAS, the majority of Florida's energy requirements are obtained from petroleum and natural gas, and supply of these fuels are subject to interruption, and

WHEREAS, wasteful, inefficient, uneconomic, and unnecessary use of energy will result in a serious depletion of energy resources and represents a potential threat to preserving the health, safety, and welfare of the people of Florida, and

WHEREAS, alternative sources of energy are years from being fully developed and there is a pressing need to accelerate research and development of these sources, and

WHEREAS, energy conservation represents a meaningful, immediate, and appropriate state response to the energy problem by eliminating waste and inefficiency and increasing economic productivity, by reducing the depletion of our domestic energy resources which, in turn, increases economic flexibility of the people of Florida, and by decreasing the pressure to develop marginally efficient methods of energy production and thereby reducing the flow of capital from the non-energy sections of the economy and avoiding serious impacts on our environment, NOW, THEREFORE, BE IT RESOLVED

IT SHALL BE THE POLICY OF THE STATE OF FLORIDA TO:

1. Develop and promote the effective use of energy in the state and to discourage all forms of energy waste.

2. Play a leading role in developing and instituting energy management programs aimed at promoting energy conservation; to include energy considerations in all planning; and to utilize and manage effectively energy resources used within state agencies.

3. Encourage local governments to include energy considerations in all planning, to support their work in promoting energy management programs, and to include the full participation of citizens in the development and implementation of energy programs.

4. Consider in its decisions the energy needs of each economic sector, including residential, industrial, commercial, agricultural and governmental uses.

5. Promote energy education and the public dissemination of information on energy and its environmental, economic and social impacts.

6. Encourage the research, development, demonstration, and application of alternative energy resources, particularly renewable energy resources.

7. Consider in its decision making the social, economic and environmental impacts of energy-related activities so that detrimental effects of these activities are understood and minimized.

8. Develop and maintain energy emergency preparedness plans to minimize the effects within Florida of an energy shortage.

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UNIT I

1. Title: Listen For Energy Being Used

Concept: Energy is the ability to do work.

Objective:

To discover the relationship between work and energy being used-- to see that energy is required to make something move

Introducing the lesson:

1. Make a series of sounds-- rap on a glass with a ruler; blow on a whistle or pitch pipe; let the air out of a balloon; snip some scissors; stamp your foot; drop a pencil; move a chair; do anything that will make a noise or a pleasant sound (play a record).
   Ask the children to tell you how you made each sound (hit the glass; blew the whistle or pitch pipe; hit the floor with your foot; hit the floor with a pencil; dragged the chair; plucked a string, etc. (You moved something.)

2. Listen quietly to your watch. Ask: "Why is it hard to hear my watch tick?" (It is a quiet sound, not loud like the sounds you made.) Say, "Some things move quietly so we have to listen carefully to hear them. But they are still moving. They are still making a sound. They are still using energy.

3. Now listen quietly for a few minutes for other sounds of things moving and making noise or pretty sounds.

Developing the lesson:

Walk down the street and listen for energy being used.

1. Let's make a list of what you heard.
   a. List all the things they mention.
   b. To add to their list, ask, "How many heard. . . a child talking; moving; the wind; leaves moving; a bird singing; another animal; a car; a truck; an airplane; a lawnmower?"
      You will be able to make your own list if you listen for outdoor sounds during the quiet listening time.

2. Let's see if we can see what made the sounds you heard. Ask, "What made the sound? What was being done? Was the thing that made the sound moving? Was it using energy? What kind? (gasoline, bird power, child power, wind power, etc.)."

Extending the lesson:

1. Move like the thing that made the noise. (Move like the wind, the car, the plane, the whatever.)

2. Listen for energy sounds at home. Make a list of home energy sounds the children heard and what made each sound.

3. Find something that uses energy without sound (electricity; flip a light switch).

4. Use the other senses to find energy being used (smell, touch).

Evaluation:

Have the children tell a story about the sounds of energy being used to move something.

UNIT I

2. Title: A Friend Uses Energy

Concept: Energy is used to make things move

Objective:

To discover the relationship between work and energy use; to show that energy is required to make things move

Introducing the lesson:

1. Divide the class into pairs of children. Each pair will have one player and one watcher.

2. For ten minutes one child from each pair will play while the other watches energy being used-- in this case, child energy. You may help the watchers record their findings with a key word on a paper.

3. Now reverse the roles of the children.

Developing the lesson:

1. Make a list of the things they saw their partners do.

2. Add to their list by asking, "Did anyone see: a push; a pull; a lift; a move; a scratching; a rubbing of a nose; an eye move; an arm lifted; a sound made, etc.?"

3. Draw a picture of a friend using energy.

4. Do a movement to show how a friend uses energy.

Extending the lesson:

1. Tell the story of your picture.

2. Repeat your movement over and over to make a dance.

Evaluation:

Ask the children to tell a short story about how their friend used energy to move something.

UNIT II

1. Title: Two Ways To Keep Warm

Concept: Heat is a form of energy

Objective:

To discover that heat is a form of energy; when energy is used, heat is given off

Introducing the lesson:

This lesson is best done on a cold day when sweaters and jackets are worn.

1. Ask, "Why did you wear a sweater today?" (To keep warm)

2. How does a sweater keep you warm? (Holds body heat in.) At this point you are introducing the concept of insulation.

Developing the lesson:

1. A study of how the body gives off heat if it is not covered. Feel your partner's forehead, neck, arms.

2. Ask, "How do they feel?" (Hot or Warm)

3. Now feel a shoulder or an arm covered by a sweater. Ask, "How do they feel?" (Cool)

4. Ask, "Is the sweater warm?" (No)

5. Ask, "What does the sweater do?" (Holds the body heat in)

6. Ask, "Where did the heat in your body come from?" (The energy in the food they ate)

Extending the lesson:

1. Ask, "What would happen if we took off all our sweaters?" (We would get cold)

2. Ask, "Is there any other way we could keep warm if we took off all our sweaters?" (Heat the room more)

3. Ask, "Which way of keeping warm is better?" (Here you will find different opinions based on different values)

4. Ask, "Which way uses less energy?" (Sweater)

Evaluation:

1. Draw a picture of yourself or a friend keeping warm on a cold day.

2. Show in any other way you wish that there are two ways to keep warm.

UNIT II

2. Title: Energy You Can Touch

Concept: Energy comes in many forms

Objective:

To recognize that there are several kinds of energy and to see that some energy can be stored (chemical)

Introducing the lesson:

1. Open a bag of jelly beans or other small bits of candy (or cereal or peanuts) and give each child one. Ask, "What kind of energy can we get from this candy (or cereal) when we eat it?" (heat, energy to move)

2. Draw a picture of energy you can touch.

3. Describe your picture.

Developing the lesson:

1. Ask, "How many kinds of energy do we have shown in our pictures?"

2. How many of you can describe your picture in another way... without words... by movement?

3. Ask, "What kind of energy should we not touch?" (electricity, heat that is too hot)

4. Ask, "Is energy stored in the candy? Nut? Cereal?"

5. Ask, "What do we call this kind of energy?" (food)

Extending the lesson:

1. You may wish to ask if there are other kinds of stored energy. (battery-- stored electricity)

2. Make a list of things that energy can be stored in.

3. Draw a picture showing energy being stored.

UNIT III

1. Title: Move Some Energy

Concept: Energy can be changed from one form to another.

Objective:

To give children the opportunity to discover that energy can be moved from place to place

Introducing the lesson:

1. Start the lesson by asking, "How is a child like a hot water pipe?" (both have heat inside; both give off heat to the air-- both are radiators)

2. Ask, "How does the heat get out of the pipe?" (the pipe gives off heat to the air)

Developing the lesson:

1. Have one of the children jump up and down until he or she feels hot. If it is a hot day they may even sweat.

2. Have other children describe what is happening to the heat in the child's body. Ask, "Can you feel heat coming from __name__?"

3. Ask, "Where did this heat come from?" (food)

4. Explain that the energy in food was first changed into the energy for jumping up and down and then into heat which was given off.

5. Ask, "Is a child like a hot water pipe?" (YES!)

Extending the lesson:

1. Draw a picture showing what happened to the food energy used for jumping. Be sure to ask, "What happened to the heat given off?" (it was lost in the air)

2. Ask the children how they might keep a hot water pipe from losing its heat to the air. (insulate it; wrap it with a "sweater")

3. Ask, What other kinds of stored energy can be changed to something else?" (battery = electrical; gasoline in a car = motion and heat)

4. Take a trip out on the school grounds near a road and watch for energy being moved. (What is in the trucks? oil, food, etc.)

UNIT III

2. Title: Warm Something

Concept: Energy can be passed from one thing to another (heat transfer)

Objective:

To give children the opportunity to discover that heat can be passed from one thing to another

Introducing the lesson:

Take the children out on the school grounds (a sidewalk or asphalt court is just as good). Ask them to find ways that heat moves from one place to another. (Keep a list as they report to you.) Ask them to bring some heat back with them (warm stone, etc.).

Developing the lesson:

1. Transfer the class list of ways heat moves to the chalkboard.

2. Now make a list of the ways the children used to bring heat into the classroom.

3. Watch the "heat" items until they have cooled. Ask, "What happened to the heat in the _____?" (It went out into the air and was lost-- just like the hot water pipe or pot).

4. Ask, "Where did the heat in the _____ come from?" (the sun) "Let's go out and see if we can heat them again."

Extending the lesson:

1. Ask the children to warm the objects in another way besides the sun. (holding them)

2. Ask, "Could you cool something by holding it or by putting it in the room?" (Yes-- by holding something hotter)

3. Ask, "Where does the heat go?" (the air)

UNIT IV

1. Title: Enjoy the Sun's Energy

Concept: We get energy from the sun.

Objective:

To give children the opportunity to discover the effects on humans of the radiant energy from the sun

Introducing the lesson:

1. Go outside the school to enjoy the sun's energy--say "hello" to the sun. (sunrise, sunset, heat)

2. Sit in the sun for a little while and make a list of the ways you can enjoy the sun. (heat, light, plants, animals, the wind)

Developing the lesson:

1. Although the process will not be understood (that is not necessary now) explain that the sun helps green plants to make and store our food.

2. Draw a picture which shows a "sun farmer" using the sun to grow plants.

3. Say "thank you" to the "sun farmer" for your food.

4. Think sun! Think of what the sun does for you--think of fire, heat, light, beauty, sunsets.

Extending the lesson:

1. Ask the children to look on the boxes of food in their homes for pictures of the sun making the food (cereal, etc.) and bring in the empty boxes.

2. Make a collage picture of the sun's energy being used by plants to make food using the children's pictures from food boxes.

3. Have the children do a dance to show how they enjoy the sun's energy.

UNIT IV

2. Title: Feel The Light Of The Sun

Concept: We get light from the sun.

Objective:

To give children the opportunity to discover that we get light from the sun

Introducing the lesson:

1. Go outside and sit in the sun. Ask the children to feel the light of the sun reach into them. (Explain that light is another kind of energy from the sun in addition to heat.)

Developing the lesson:

1. Ask the children to tell how they enjoy the light from the sun.

2. Ask, "How is the light different from the dark?" (It is dark when there is no light; we can't see.)

3. Ask, "What do we do when it is dark?" (We use another kind of energy to light things--electricity.)

Extending the lesson:

1. Ask the children to make up a story about their energy reaching out to the sun.

2. Ask, "Do all living things like the sunlight as much as you do?" (No. Some animals come out only at night. Others live in dark caves and tunnels.)

3. Draw a picture of yourself enjoying the sun's energy.

UNIV V

1. Title: My Energy Needs

Concept: People use energy to satisfy their needs.

Objective:

To discover how we use energy to supply our needs

Introducing the lesson:

1. Have the children make a list of all the things they need and the energy they use. (Be sure they have listed food, clothing, shelter and transportation.)

Developing the lesson:

1. For each item on the class list of energy needs, decide if it is really needed in order to live or if it is something that we could get along without. (Only food, clothing, transportation and shelter are needed.) Others are things we do not need but want.)

2. Ask, "What do we need each one for?" (food to warm and move the body; clothing and shelter to protect us; transportation to move us and the goods we need from one place to another.)

Extending the lesson:

1. Now make a list of other things they use at home or in school that they could get along without. (TV, radio candy, sugar, coke, electric appliances.)

2. Ask the children what they would have if they could have anything they dreamed of?

3. Ask them to draw a picture of them in their dream world.

Evaluation:

1. Look at some of the dream world pictures. Ask the children what kinds of energy the dream worlds would need to make them "go".

2. Ask these questions:
a. "Are there things we can get without spending money?" (Yes) Have children name some things.
b. "Are there things we can get without spending energy?" (No) Discuss why not.

UNIT V

2. Title: Do Something You Like-- Change Something

Concept: People use energy to do things.

Objective:

To discover that children use energy to do things

Introducing the lesson:

1. Ask the children to use energy to do something. (Let them be creative. You must be patient. Do not give them any ideas. They will turn on a light, move something, dance, sing, talk.)

2. Make a list of the things children use energy for.

Developing the lesson:

1. Try to classify the things the children did into kinds of energy.
   a. How many used energy to heat something?
   b. How many used energy to light something?
   c. How many used energy to move something?
   d. How many used energy to grow?
   e. How many used energy that was stored?

2. Use energy to change something they do not like to something they like.

Extending the lesson:

1. Ask the children how they decided what they would use energy to change. (values)

2. Ask the children to observe the difference between their use of energy and the use of energy by their parents or grandparents. (Older people do not grow, play, etc. as much and therefore do not need as much energy.) Ask, "Are old people always hungry like you are? Do they run as much?"

3. Ask, "Does a candy bar give you lots of energy?"

4. Ask, "How do you know when a friend has lots of energy?"

5. Ask them to try to change back the object they changed earlier in this lesson to the state it was in originally. (The heat lost in the change is lost forever. A new supply of energy will be needed. Some changes cannot be changed back-- growth, for example.)

UNIT VI

1. Title: Let's Share Some Energy

Concept: Energy supplies are limited and must be shared.

Objective:

To discover that energy supplies are limited and must be shared by all. (Scarcity)

Introducing the lesson:

1. At the beginning of the lesson, open a bag of jelly beans or peanuts and start passing them out. Be sure that there are fewer pieces of candy than there are class members. (Later you can give a piece to those who were left out.)

2. Say, "Now you have seen a shortage of energy; there was not enough energy to go around. If the jelly beans were all we had to eat, how would we decide to divide them? Who would get the food?" (first ones, biggest, strongest, best student, one who was hungriest, one who cried?)
Note: Now that the concept of scarcity has been introduced you can give a piece of candy to those who didn't get one at first.

Developing the lesson:

1. Ask, "What if I had cut the jelly beans in half? Would we have had a piece for everyone?" (Yes, but each one would have had less.)

2. Ask, "Do you need energy to work?" (Yes)

3. Ask, "If you don't have food can you work?" (Not for long)

4. Ask, "Should you eat a good breakfast so that you can do your school work?" (Yes)

5. Find some pictures in a magazine of children who are hungry. Ask, "What kind of energy is scarce?" (food)

6. Ask, "What other kinds of energy might be scarce?" (gasoline, wood)

7. Ask, "What kinds of energy might never be scarce?"

Extending the lesson:

1. Have the children draw pictures showing too many people and not enough food.

2. Have them write or tell a story about their pictures.

UNIT VI

2. Title: Getting Tired

Concept: Energy supplies are limited.

Objective:

To have the children discover that the energy in their bodies is limited

Introducing the lesson:

This lesson should be done after play period.

1. Ask, "Who is tired from all our exercise?" (everyone will be tired)
2. Ask, "What energy supplies are limited or scarce?" (body energy)
3. Ask, "Where did our body energy go?" (into movement which made us hot; the heat went into the air)
4. Ask, "How can we get a new supply of energy?" (eat, drink)

Developing the lesson:

1. Show pictures of people who have used up all their energy. (tired laborers, athletes, etc.)
2. Ask, "How can all these people get a new supply of energy?" (eat, drink)
3. Ask, "Who would get tired first, someone who had plenty of food or someone who was hungry?"
4. Make a bulletin board display of tired people.

Extending the lesson:

1. Do a movement which shows how you feel when you are tired.
2. Teach it to a friend. Then you will have made a "Tired Dance".
3. Now show how the dance would go if you had some food and a little rest.
4. Ask, "Do you think you could get along with a little less food so that some hungry children might have more?"
5. Let's make a list of what we could give up without losing all our moving energy. (This is a good way to start developing the distinction between what they need and things they could do without-- or would be better without (sugar).

UNIT VII

1. Title: My Environment Supplies Energy

Concept: We depend on the environment for our energy.

Objective:

To give children the opportunity to discover their dependence on their environment for their energy-- to discover where their energy comes from

Introducing the lesson:

1. Review (or make a new) list of all the kinds of energy used by the children in the class.

2. For each kind of energy on the list, try to find out where it comes from: i.e. heat-- oil, gas, electricity, sun; food-- farms.

Developing the lesson:

1. For each item on the class list, have the children try to trace the energy back to where it came from. (For example, oil from the ground)

2. Do a special list to show where different kinds of food come from. (fruit-- trees; cereal-- soil; fish-- water; meat-- animals; milk-- animals. All come from the environment.)

Extending the lesson:

1. Have the children draw a picture showing where the energy they use comes from. (soil, water, air, plants, animals, rocks) Be sure they show the energy from the sun.

2. Have them explain their pictures to the rest of the class.

3. Ask, "Where does your energy come from?" (My environment.)

UNIT VII

2. Title: I Depend On Others For My Energy

Concept: We depend on others for our energy needs.

Objective:

To give children the opportunity to discover that many other people are needed to supply their energy needs

Introducing the lesson:

This lesson should be done following the preceeding lesson "My Environment Supplies Energy".

1. Make a list of all the kinds of energy the children use. (Be sure they have included food, heating, lighting, appliances, electricity, sun, gasoline.)

2. For each item on the list add what the energy is used for.

Developing the lesson:

1. For each item on the list, try to find out how the energy is brought to their school or home. (wire, truck, child carried)

2. Draw a picture showing how energy is brought to your school.

3. Tell the story of your picture to the class.

Extending the lesson.

1. List all the kinds of people you depend on for your energy. (farmers, miners, oilmen, truckers, power plant workers, loggers, cooks, food packagers, sailors, dock workers, etc.)

2. Where did my energy come from? Investigate the places where energy for your use came from. (addresses on candy wrappers and food packages, Arabia, Venezuela, Texas, Louisiana, sun, etc.)

3. How do others depend on you for energy? (share food, heat, light)

4. Ask, "How does a teacher use her energy to help her students?"

5. Ask, "How do students use their energy to help the teacher?"

6. Ask, "What do you call it when everyone depends on everyone else?" (IN-TER-DE-PEN-DENCE)

7. Ask, "What other energy words have we learned?"

8. Make an energy word list and repeat the words over and over.

UNIT 1

1. Title: Body Language

Concept: Energy is used to make things move.

Objective:

To have the children discover that energy is used to make things move--that they can use body energy to send a message

Introducing the lesson:

1. At the start of class, try to use body language rather than speaking to send messages to the children. (be quiet, listen to me, be happy, be angry)

2. After a short time, ask the children if they can send a message to you using body language. (raise a hand, watch me, listen, be happy)

Developing the lesson:

1. Ask the children to use their bodies to demonstrate

   a. sunlight (shining)
   b. electricity (pulsing, flowing)
   c. coal being mined (shoveling, pushing cart)
   d. oil being spilled (flowing)
   e. heat moving (waves)
   f. light coming through a crack
   g. energy changing
   h. a story they would like to tell (pantomime)

Extending the lesson:

1. Ask the children to:

   a. draw one of the movements they made
   b. do a body movement without using energy (they can't; even deciding not to move requires nerve energy)

2. Go outside along a street and watch for ways people use body energy to send a message.

   a. watch them gesture as they talk
   b. look for body signals (ready, turn, etc.)

3. Ask the children to show what they saw without talking.

UNIT I

2. Title: Move An Object

Concept: Energy must be used to put an object in motion.

Objective:

To discover the relationship between energy and motion--to see that energy is required to make something move

Introducing the lesson:

Use an unwound clock or watch, or an electric clock which is not plugged into an electrical outlet.

1. Ask the children to watch the clock, to listen for the tick. They will soon see that the clock is not running.

2. Ask the children to suggest why the clock is not running. (not wound, not plugged in, broken...)

3. Ask the children how they can check each of their suggestions.

4. Let the child who made the correct suggestion wind the clock or plug it in. Then watch or listen again.

5. Ask why the clock is now running. (It is now wound or plugged in)

Developing the lesson:

Develop with the class a list of other things that need energy to move. (toys, trains, cars, animals)

1. Ask the children to bring in some of their favorite windup toys.

2. Let the children tell of their experiences with their toys.

3. Ask,
"Why do you have to wind the toy?" (it has a spring)
"Did you use energy to wind the toy?"
"How is energy stored in the toy?" (You may be able to show the children the spring in a broken toy or watch with the back removed.)
"Would the key alone make the toy move?"
"Would the spring alone make the toy move?"
You can now lead the children to see that the clock, the spring, and the key were there when the clock was not running; but the clock did not run. There was no energy to make it move. Energy is needed to make an object move.

Extending the lesson:

1. Look for examples of larger machines that do not move until energy is used. (appliances, cars, trucks and airplanes)

2. Develop a word chart of energy words--an "ENERCHART".

3. Have the children use each energy word--"ENERWORD"--in a sentence to indicate their understanding of the word.

4. Ask the class to suggest other things that can be moved without springs or electricity. (walking, throwing a ball)
   Discuss the sources of energy for each suggestion. (food, gasoline, wind, water)

5. Draw pictures of people moving things.

6. Make up a story of something you have done to make something move.

7. Make a bulletin board display of things being moved with energy.

8. Write a class experience chart of class discoveries.

UNIT II

1. Title: Getting Heat

Concept: Energy use produces heat.

Objective:

To discover that heat is given off when energy is used.

Introducing the lesson:

1. Rub your hands together.
2. Ask the children to rub their hands together.
3. Ask, "What happens when you rub your hands together?" (they get warmer)
4. Ask, "What happens when the parts of a car engine rub against one another?" (they get hot)

Developing the lesson:

1. Ask the children to show two different ways to keep warm. (jump, put on clothes or a blanket, drink a cup of hot chocolate, sit by a heater, etc.)
2. Ask them how they could keep warm without getting out of their seats. (move arms and legs, generally same ways as in #1)
3. Now ask them if they think one of the ways is enough. (Can they jump all day and night?)

Extending the lesson:

1. Ask the children to draw a picture of a friend keeping warm:

   a. at school
   b. at home
   c. outdoors

2. Ask, "What happens to the heat that is produced when energy is used?" (lost in air)

   a. body (cools)
   b. car engine (cools)
   c. fire (goes out)
   d. electricity in heater, toaster, stove

3. Draw a picture of heat being lost or wasted.
4. Make a list of energy words learned in this lesson.

UNIT II

2. Title: Energy Can Be Stored

Concept: Energy comes in many forms.

Objective:

To discover that energy is stored in many things

Introducing the lesson:

1. Bring in a big bag full of energy. (box of food, flashlight battery, thermos of hot tea or coffee, can of oil, candy, nuts, potato chips, etc.) Do not show the children what is in the bag! Leave in on your desk!

2. When the children ask what is in the bag, tell them it is "full of energy".

3. Ask, "What do you think is in the bag?"

Developing the lesson:

1. After the children have finished guessing what is in the bag, let them feel (but not look at) what is in the bag. Do not tell them what is in the bag.

2. Now ask them to collect ten (10) kinds of energy they can touch.

3. Do the same for energy they can hear, smell or taste.

4. Show them what is in your bag!

Extending the lesson:

1. Ask, "How are all the kinds of energy we have talked about the same?" (all stored in food, wood, coal, oil, battery, etc.)

2. Ask, "Can you think of some stored energy that would not fit in a bag?" (oil or gasoline)

3. Ask the children to show a way of making their energy collection stimulate all the senses at once. (open the bags and boxes and have a little party!)

4. Add any new words to the class energy word list.

UNIT III

1. Title: Fill A Box With Energy

Concept: Energy can be transferred from place to place.

Objective:

To give children the opportunity to discover that energy can be captured for man's use

Introducing the lesson:

1. Bring in a big box (a box big enough to hold some children--refrigerator box, stove box, etc., from appliance store) and leave it at the front of the room. When asked what it is for, say, "We are going to fill it with energy today."

2. Ask, "What do you think we can put in it?"

Developing the lesson:

1. Say, "Let's fill the box with sunlight." Outdoors is best unless your classroom is facing the sun. Ask, "What is happening?" (box gets warmer)

2. Say, "How let's fill the box with heat." (use sun-warm objects)

3. Now, "Let's fill the box with children." Ask "Is that a way to fill a box with energy?" (box should get warmer...both inside and outside)

4. Ask, "How could we keep the sunlight, heat or children in the box (store energy)?" (Can't: heat and children will escape; sunlight will not enter the closed box. Have a child check this.)

Extending the lesson:

1. Ask the children to think of a box that could hold more than one kind of energy. (classroom, pantry, refrigerator, stove, food box) You might wish to discuss the danger of refrigerators to children.

2. Ask, "How is a house like our box?" (full of energy being stored and used)

3. Add new words to the class energy word list.

UNIT III

2. Title: Moved By The Wind

Concept: Energy can be changed from one form to another.

Objective:

To discover the relationship between moving air and energy--that moving air has energy

Introducing the lesson:

1. On a windy day, take the class outside. Let a few sheets of paper blow from your hand (in a place where there are no cars).

2. Ask the children to catch the papers.

Developing the lesson:

1. Ask, "What is needed to make something move? Remember our moving toy lesson." (energy)

2. Look for other things that are being blown by the wind. (flag. trees, hair, clothes)

3. Ask, "How do people use the energy of the wind (moving air) to move things?" (sailboat, fan)

4. Be your own wind. (blow out a candle, blow away a seed)

Extending the lesson:

1. Ask the children to:

   a. draw a picture of a sailboat on a calm day (no wind)
   b. move like the wind (children will be very creative--blown by the wind as a leaf, a bird, a paper; jumping into clouds; being blown away; snowing)

2. Catch the wind (make a sail with your jacket).

3. Ask, "Does moving air have energy?" (Yes)

4. Tell a story about a seed being moved by the wind.

5. Add new energy words to the class energy list.

UNIT IV

1. Title: Get Energy From the Sun

Concept: Most energy comes from the sun.

Objective:

To discover the relationship between the sun's energy and the energy we use

Introducing the lesson:

1. Open the window drapes or shades and let the sun shine in.

2. Ask, "What happens when we let the sun shine into the classroom?" (heated, lighted)

Developing the lesson:

1. Ask, "How can we show that we can get heat from the sun indoors?" (feel the window sill, put a cold object on window sill and leave it for a few minutes, feel the sun on our backs)

2. "Let's go outside and see if we get heat from the sun outdoors." (If it is a cold day it may be harder to do. Sit with backs to sun. Feel children's clothes. Compare dark and light clothes.)

3. Ask, "What other kind of energy do we get from the sun?" (light)

4. Compare places in the sun with places in the shade. Ask, "Which is hotter? Which is lighter?"

Extending the lesson:

1. Go outside and look for ways people use heat from the sun. (swimming, sunbathing, drying laundry)

2. Ask the children how their parents use the heat of the sun at home. (sunbathing, growing plants, heating swimming pool, porches and patios)

3. Look for ways people keep the heat of the sun out of buildings. (drapes, blinds, awnings)

4. Draw a picture of people using the sun's energy.

5. Add to the class energy word list.

UNIT IV

2. Title: Use The Sun's Energy

Concept: We can use the sun's energy.

Objective:

To discover that the energy of the sun is used by people

Introducing the lesson:

1. Turn off the lights and darken the room enough so that it is too dark to look at pictures.
2. Tell the class you are going to show them some pictures of people using the sun's energy.
3. Hold up several pictures of people growing plants, sitting in the sun, etc.
4. Ask, "Why are we having so much trouble seeing the pictures?" (not enough light)
5. Ask, "How can we get more light?" (turn on lights, open drapes)
6. Let the child who suggested opening the drapes open the drapes. Do not turn on the lights yet.

Developing the lesson:

1. Ask the children to pretend that there are no electric lights.
2. Ask, "Is the light enough for us to see the pictures now?" (show the pictures again)
3. If there is enough light, ask, "Where does the light come from?" (the sun)
4. If it is still too dark to see the pictures well, take the class outside the school and show them the pictures.
5. Ask, "How have we used the sun's energy?" (light energy to see)

Extending the lesson:

1. While the class is outdoors, review what they have learned in the previous lesson about heat energy from the sun.

2. Look for a place where the grass is covered with a board or paper. Remove the board or paper. The grass will be yellow or dead. Ask, "Why is the grass yellow or dead?" (no sunlight; no energy from the sun)

3. Draw a picture of our school without the sun's energy.

4. Draw a picture of a farm without sunlight.

5. Have the children tell a story of the sun's energy.

6. Add to the energy word list.

UNIT V

1. Title: Using Energy In Our School

Concept: Energy is used to provide for people's needs.

Objective:

To give children the opportunity to discover how people use energy to provide the things they need--to give them heat and light--to move things

Introducing the lesson:

1. Turn out the lights. Ask, "Do we need the lights turned on today?" (yes)
2. Ask, "Do we need energy to turn on the lights?" (yes)
3. Ask, "What else do we need energy for in school?" (heat, to move things)

Developing the lesson:

1. Take a walk through the school to look for people using energy. Look for machines, heaters, air conditioners, lights, appliances in the kitchen.
2. Discuss each item on the list and why energy is used. (report needs of people--to see, to learn, to eat, to wash dishes, to move)
3. Ask, "What would our school be like without energy?" (darker, no TV or films, no cooking, no dishwasher all cleaning done by hand, etc.)

Extending the lesson:

1. Have the children draw a picture of a classroom or school without electricity.
2. Have them describe their pictures. (Be sure to ask about other sources of energy.)
3. Show pictures of schools in places without electricity.
4. Add to the energy word list.

UNIT V

2. Title: People Using Energy

Concept: People use energy to change things.

Objective:

To discover the relationship between the use of energy and people's needs

Introducing the lesson:

1. Take the class outside to a place on the school grounds where a street is in view and have the children watch for people using energy for their needs.

2. Keep a list of the energy uses the children see, (food, transportation, to move things, to change things, dig a hole, play, etc.)

Developing the lesson:

1. Ask, "What is being moved in trucks?" (The children may not be able to read the signs on the trucks, but you can help them identify an oil truck, food truck, moving truck, etc.)

2. Ask, "Where do you think people in the cars are going?" (to store, beach, work, etc.)

3. Ask, "Do people need energy to move things?"

4. Ask, "Did anyone see energy being used to change things?" (yes; holes being dug, earth moved, buildings built, roads repaired, etc.)

5. Ask, "Do people need energy to change things?"

Extending the lesson:

1. Draw a picture of energy being used to change something.

2. Draw the same picture with another kind of energy being used. (horse and wagon, shovel)

3. Show how energy is used in another way--by movement.

4. Make up a story about you moving something and making a big change.

5. Add to the class energy word list.

UNIT VI

1. Title: How Much Is Enough?

Concept: Energy supplies are limited.

Objective:

To discover that energy supplies may be limited because people use more than they need

Introducing the lesson:

1. Bring a box of cereal, a bag of dried beans, jelly beans or small pebbles. Say, "In this bag (box) is all the food that is left on earth. Each piece will supply all the energy one person needs for a day."

2. Start passing out energy pellets, one at a time.

3. Ask, "Did everyone get energy today?"

Developing the lesson:

Keep passing out "daily rations" of energy until it is scarce; then until there is none left.

1. Ask, "Did everyone get energy today?" (no)

2. "Why?" (Our energy is all gone.)

3. Ask, "What can we do?" (Get more energy or try to live without it.)

Extending the lesson:

1. Ask, "What does "scarce" mean?" (There is not enough to go around.)

2. Draw a picture of yourself without enough food.

3. Describe your picture to the class.

4. Discuss with the children what the United States is doing to share its extra food with people who are hungry. Ask, "How can we help to feed hungry people?" (By not wasting food or eating more than we need.)

5. Add to the class energy word list. Review the list from time to time.

UNIT VI

2. Title: Going Without Energy

Concept: Energy supplies are limited.

Objective:

To discover the relationship between supply and demand for energy

Introducing the lesson:

1. Turn off the lights and say, "Today we are going to pretend that we are living in a time when energy is scarce. There has been an accident at the power plant and we will be without electricity for a week."

2. Ask the children to draw a picture showing them in their home without electricity.

Developing the lesson:

1. Ask the children to describe their picture to the class.

2. Ask, "What things do you miss most in your home without electricity?" (TV, lights, stove, refrigerator, etc.)

3. Ask, "Which things did you think you could get along without?" (TV)

4. Ask, "Which things could you not get along without?" (refrigerator, etc.)

Extending the lesson:

1. Use the class list to discuss substitutes for their electric appliances. (candles, oil lamps, flashlights, games for entertainment)

2. Ask, "Do these substitutes use energy?" (yes, but not so much)

3. Ask, "How could we keep food without a refrigerator?" (We could not. We would have to shop for fresh food every day or use canned or preserved food.)

4. Tell the children about places in the world where there is no electricity--where people do not have to pretend there is a blackout--where energy supplies are limited.

5. Add to the class energy word list.

UNIT VII

1. Title: Wild Animals Need Energy

Concept: Living things are dependent on their envionrment.

Objective:

To discover that animals depend on their environment to supply their energy needs--their food and shelter

Introducing the lesson:

1. Bring a pet or ask a child to bring in a pet hamster, turtle or rabbit to the classroom.

2. Ask, "How is this pet animal like a child?"

Developing the lesson:

1. Make a list of the needs of animals.

2. Ask, "Are the needs of wild animals the same as the needs of pet animals?" (yes)

3. Ask, "Who supplies the needs of pet animals?" (the pet owner)

4. Ask, "Who supplies the needs of wild animals?" (They are supplied by the environment of the animal--they catch their own food, build their own shelter, etc.)

Extending the lesson:

1. Ask, "How can we help wild animals get all the energy they need?" (We have to protect places where wild animals live, like forests, parks, lakes and swamps.)

2. Make a list of the wild animals that the children have seen and the food each one needs for energy.

3. Add to the class energy word list.

UNIT VII

2. Title: I Can Help

Concept: Energy can be saved in many ways.

Objective:

To discover that energy can be saved by people--that each individual can help to conserve energy

Introducing the lesson:

1. Read the following letter from the principal of the school:

Dear Children:

Each month our bill for electricity and fuel is getting higher, so we must save energy. If we do not, we will have less money for our playground equipment and field trips to neat places like the Nature Center.

So I am asking each of you to plan with your teacher how we can save energy in our school.

Thank you for your help, and good luck.

Sincerely,

_____, Principal

Developing the lesson:

1. Ask the children how they think the class could save energy. (Do not make any suggestions. Let them come up with their ideas first.)

2. When you have listed all the children's ideas, use this checklist to raise questions about things they may not have thought about.

   a. Are we using more lights than we need?

   b. Do we need to keep the room so warm or so cold? (Could we wear a sweater?)

   c. Do we leave lights on when we go to lunch or recess?

   d. Can we open windows on pleasant days instead of using air conditioning or heat?

3. List the ideas on the board as "Our Energy Conservation Program" (CON-SER-VAY-SHUN; conservation is just a big word for "saving".)

4. Invite the principal to come and see what you are planning to do to conserve (save) energy.

   a. Ask your principal to suggest other things.

   b. Ask if the other classes have an energy conservation program.

   c. Ask if there is a program for the cafeteria, kitchen, auditorium, hallways and the principal's office.

Extending the lesson:

1. Have the children design a sign they could put over the light switch to remind them about turning off unneeded lights.

2. Keep a record for a week of the number of minutes (hours) of light the class saved.

3. If this lesson is continued, ask the principal to compare the amount of energy used during the first month with the same month last year.

4. Have the children draw pictures of them saving energy.

5. Do an energy conservation dance.

6. Ask the principal to host an energy conservation party to celebrate the energy savings.

UNIT I

1. Title: Energy Makes Things Grow

Concept: Living things use energy to grow.

Objective:

To discover the relationship between food energy and growth

Introducing the lesson:

1. Show the children pictures of mother animals and their young, ranging in size from a whale or elephant (ask the children to name the largest and smallest animals) to a fly. Be sure to include a human mother and baby.

2. Ask the children to arrange the pictures around the room from the largest to the smallest (help them to distinguish between a large picture of a dog and a small picture of an elephant--or try not to use pictures which will confuse children regarding size).

Developing the lesson:

1. Ask, "How will the baby animal get to be as big as its mother?" (it will grow)

2. Ask, "What will the babies need in order to grow?" (food for energy)

3. Ask, "Is all the energy in our food used to help us grow?" (no; some is used to keep us warm and some to make us move)

4. Let's find out how much energy (calories) is in our food. For a week, have the children bring in empty cereal boxes, food boxes (jello, etc.) and candy wrappers. Have them compare the number of calories and the amounts of protein, carbohydrate and fat in the foods.

5. Have the children compare the calories in sugared cereals, for example, between corn flakes and "frosted" corn flakes.

Extending the lesson:

1. Ask the children if they think older people who have finished growing still need energy (food). (Yes; they still need to move, keep warm, and grow new body cells which wear out--repair their bodies.)

2. Ask, "Will a dog get as big as an elephant if it keeps eating?" (No--dogs grow into dogs; only baby elephants grow into elephants. But some human babies may grow a little bigger than their parents if they eat lots of good food.)

3. Ask, "Do you know any child who is bigger than its mother or father?"

4. Draw a picture of an animal growing up and tell the story of the picture.

5. Start an energy word list--calorie, etc.

UNIT I

2. Title: Send Your Energy Over A Long Distance

Concept: Energy can be used to move things.

Objective:

To discover that energy can be used to move things--even other energy

Introducing the lesson:

1. Stand quietly in front of the class. Scowl or put your hands on your hips when one of the children is noisy or "hyper". Then clap quietly when a child is quiet and sits still.

2. Ask, "Did you get my message?"

Developing the lesson:

1. Ask the children to send a message to you or to a friend without talking.

2. List the ways that children sent their messages without talking. (sign language, body language, knocking, rubbing their stomach, doing pantomime, etc.)

3. Ask, "How do animals send messages?" (sing, scratch, peck, knock, smell, etc.)

4. Ask the children to try and understand their favorite TV cartoon without the sound on Saturday and report back to the class on Monday.

Extending the lesson:

1. Have the children list the ways that they could send or receive energy over a long distance. (telephone, TV show from Hollywood, etc.)

2. Draw a picture of yourself sending a message to your teacher.

3. Ask, "Can we get all of the energy we used back again?" (No--most of the energy we use if gone forever, lost as heat or motion. New energy must be used.)

4. Add to the class energy word list.

UNIT II

1. Title: A Ray Of Light

Concept: Light is a form of energy.

Objective:

To give children the opportunity to discover that light is a form of energy from the sun

Introducing the lesson:

1. If you do not have a window in the classroom into which the sun shines, take the class to the cafeteria, auditorium, library or any room with sun coming in the window.

2. Close the drapes or put a piece of cardboard or oaktag with a hole in it (the hole should be odd shaped) so the sunlight comes through and makes a lighted spot on the floor or on dark paper.

3. Ask the children to find a ray of light coming through the crack or hole and watch it change. (it moves, changes shape)

Developing the lesson:

1. Ask the children to feel the light.

2. Ask the children to describe the light.

3. Ask the children to draw a picture of themselves if they could crawl into the ray of light.

4. Ask the children to describe their picture.

Extending the lesson:

1. Take the class outside and demonstrate how a magnifying glass can focus (gather) the rays of light on a paper and burn a hole in it.

2. Ask, "Is there heat in the sun's rays?"

3. Ask, "What kinds of energy do we get from the sun?" (heat and light)

4. Ask, "Can the sunbeam be your new friend?"

5. Add to the class word list.

6. Ask the children to use the new energy words in a sentence.

UNIT II

2. Title: Where Energy Comes From

Concept: Energy comes in many forms.

Objective:

To give children the opportunity to discover the various forms of energy in their environment

Introducing the lesson:

1. Hand out drawing paper or butcher paper and a box of crayons; ask the children to draw a picture showing where energy comes from. (Do not give any help at all. Let the children go. Make no comment on their efforts until your planned time for this activity is up. (10-15 minutes)

Developing the lesson:

1. Ask each child to describe their picture.

2. List the sources of energy the pictures suggest.

3. Try to get the children to go all the way back to the real source--the sun--for all food and wood; millions of years ago for fossil fuels; uranium for atomic energy (omit uranium unless they mention it).

4. Make an energy chain of children from the sun (first child) to food or fuel (last child).

Extending the lesson:

1. Follow the same procedure to discover where energy goes. (eventually to waste heat)

2. Now draw pictures of energy being wasted.

3. Make a list of the examples of energy waste.

4. Get class suggestions on how to waste less energy.

5. Add to the class energy word list.

UNIT III

1. Title: Energy Goes From Place to Place

Concept: Energy can be moved from one place to another.

Objective:

To give children the opportunity to discover the relationship between the place where energy is found and where it is used

Introducing the lesson:

1. Bring an ice cube to class and put it in a dish where the children can see it.

2. Ask, "What is happening to the ice cube?" (it is melting)

3. Ask, "Why is the ice cube melting?" (getting heat from the air and from the dish)

Developing the lesson:

"You have all seen an example of heat being passed from one object to another."

1. Let us look for examples of energy being passed:

   a. from one living thing to another (food)

   b. from one place to another (heater)

   c. from one object to another (toaster to bread; iron to cloth)

   d. from an object to a person (hot seat)

   e. from a person to an object (cold seat)

Extending the lesson:

1. Take the class outdoors. Give each child an ice cube and tell them to keep it from melting (keep the heat from it) in any way they can. (let them wrap it, bury it, hold it, etc., do not help them)

2. Give an energy award--ENERWARD--to the child whose ice cube last longest.

3. Ask, "How can we keep heat from the ice cube?" (insulation)

4. Why were some methods more successful than others?

5. Ask how we could keep the energy from moving in the instances we discussed earlier in this lesson. (see section on lesson development)

6. Add to the class energy word list.

Materials needed:

1. 2 trays of ice cubes

2. newspapers, bags or any insulating materials

UNIT III

2. Title: Give Some Energy To Someone Who Needs It

Concept: Energy can be changed from one form to another.

Objective:

To give children the opportunity to discover the relationship between the forms of energy and how people use them

Introducing the lesson:

This lesson is best done on a cool day.

1. Fill a bottle with hot water. (not too hot to hold)
2. Ask, "Who has cold hands this morning?"
3. Pass the hot water bottle to one of the children who raised their hands, saying, "I have just moved some heat energy from the water bottle to _____'s hands. I have just given energy to someone who needed it."

Developing the lesson:

1. "Let us see if we can think of other ways that energy could be given to someone who needs it."
2. Make a list of the children's suggestions. If they have trouble with this suggest:

   food--to hungry person
   fuel--to cold person
   light--to person going out at night, etc.

3. Ask, "Can energy be moved from one place to another?" (yes)

Extending the lesson:

1. Ask the children to show you how energy can be moved and used in another place.
2. Ask them to get the energy back. (can't--once it is used, it is gone forever--or changed to another form)
3. Ask the children to use some energy to smile while the energy is being transferred.
4. Add to the class energy word list.

UNIT IV

1. Title: The Sun Affects Our Lives

Concept: We get energy from the sun.

Objective:

To give children the opportunity to discover the energy of the sun's radiation on the earth

Introducing the lesson:

1. Wet 2 paper towels in a dish of water or under a faucet.

2. Ask, "How can I get these towels dry again?"

3. When the alternatives--"put them in a clothes dryer" or "hang them in the sun, etc." have been given by the children, say, "Let us go out and see if the energy of the sun can dry the towels."

Developing the lesson:

1. Have the children decide where to place the towels (be sure that one is placed in the shade).

2. You may wish to wet more towels so that more alternative methods may be tried.

3. Compare hanging towels with towels on the ground.

4. Compare towels in the sun with towels in the shade.

5. Compare windy and calm places.

6. Note: explain that wind is air that is moving because it has been heated by the sun, so the energy from the sun may dry the towels directly (with heat) or indirectly (by evaporation).

Extending the lesson:

1. Ask, "Why do you think so many people dry their clothes in an electric dryer instead of handing them in the sun to dry?" (You will get some great answers--air too dirty, too much work, machine drys clothes at night or on rainy days, outside is too messy, live in an apartment, no room, etc.)

2. Do a class survey to see how many of the children's parents use the sun to dry clothes.

3. Do a survey of how grandparents dried their clothes.

4. Add to the class energy word list.

UNIT IV

2. Title: Energy From The Wind

Concept: Wind is a form of solar energy.

Objective:

To give children the opportunity to discover the relationship between energy and the wind

Introducing the lesson:

1. Take the children outdoors, gather them in a circle around you and ask them to take twenty steps away from you and look for something being moved by the wind.

2. Ask them to come back to the circle around you as soon as they have found something being moved by the wind, but not to tell anyone what they have found.

Developing the lesson:

1. Ask the children one by one to come to the center of the circle and move like the something they found. Tell them not to tell anyone what they found.

2. Have the rest of the class try to guess what it was that each child found being moved by the wind.

Extending the lesson:

1. Ask, "When the wind moves things, is it using energy?" (yes)

2. Ask the children which movements they liked best. Let them all try to do that movement. They will have created a dance which shows how the energy of the wind moves things.

3. Using movement, compare the energy in a gentle breeze with energy in a gale.

4. Have the class draw pictures of themselves or friends moving like the wind.

5. Ask several children to describe their pictures.

6. Ask about personal experiences with wind (hurricanes, gales, dust storms).

7. Add wind words to the class energy word list.

UNIT V

1. Title: My Energy Use

Concept: People use energy in many ways.

Objective:

To give children the opportunity to discover how they use energy in their daily lives

Introducing the lesson:

1. Ask, "Have you used any energy today?"

2. Make a list of the things the children mention.

Developing the lesson:

1. After the class list is "complete", look for things the children may have overlooked. ("How did you get to school?" "Did someone lift you out of bed and carry you to breakfast?" "Did someone carry you onto the bus, into the school, down the hall?" Is the room warm, lighted, clean?" In short, everything you do and everything you use requires energy.)

2. Go down the list asking, "How could we save energy for this use?"

Extending the lesson:

1. Draw a picture of yourself using energy.

2. Draw the same picture showing energy being saved. (conserved)

3. Explain your energy conservation picture.

4. Add to your class energy word list.

UNIT V

2. Title: My Class Uses Energy

Concept: People use energy in many ways.

Objective:

To give children the opportunity to discover the many uses of energy in their school

Introducing the lesson:

This lesson is really an extension of the previous lesson. However, it can be used alone--or first.

1. As the lesson starts, go and turn off the lights saying, "Today we are going to discover whether or not our class can save some energy (just as we investigated how each of us could save energy alone)."

2. Ask, "Can we get along without the room lights?" If it is too dark, ask, "What can we do to get enough light?" (open the drapes)

Developing the lesson:

1. Make a list of the ways the class uses energy (field trips; heating room, cafeteria, library or auditorium; air conditioning). Do not list individual uses of energy.

2. Have the class make up a story about what the class could do to save energy (conservation).

3. Do it!

Extending the lesson:

1. Tell the principal and custodiam about the class energy conservation plan.

2. Ask the custodian to take out one out of every four of the fluorescent lamps. Ask the class to investigate whether they have enough light.

3. Do the same for heat or air conditioning. (a degree or two)

4. Ask, "How could we change the classroom temperature and still be comfortable?" (sweater for less heat; light clothes for air conditioning)

5. Extend the energy survey to the homes of the class.

6. Add to the class energy word list.

UNIT VI

1. Title: Energy Is Lost

Concept: When energy is used, some of it is lost and cannot be used again.

Objective:

To discover the relationship between energy use and energy loss...usually as heat

Introducing the lesson:

1. Burn a few small pieces of paper in a foil pie plate filled with sand. As the flame burns down, ask, "How can I keep the fire burning so we can get more heat or light?" (add more paper-(fuel)

2. Ask, "Can we get more heat or light out of the burned paper?" (No. Once the energy in the paper is used up, it is done forever. It is lost to the air.)

Developing the lesson:

1. Ask, "What other uses of energy cause heat to be given off?"

2. Make a list of the class suggestions. (food energy; gasoline, oil, wood, coal (fuel) energy)

3. Ask, "Can we use any of these again?" (No)

4. What happens to the energy that is used? (burned up to produce motion and heat)

Extending the lesson:

1. For each energy use, ask the children to suggest how the energy supply can be restored. (gasoline station, etc.; eating, etc.)

2. Draw a picture of a friend using energy.

3. Have the children explain how the use of energy in their picture uses up the energy supply. (changes to heat energy which is lost)

4. Add to the class energy word list.

UNIT VI

2. Title: Not Enough Food

Concept: Energy supplies are limited.

Objective:

To discuss the relationship between food energy supplies and the needs of people for energy--scarcity

Introducing the lesson:

Take the class out on the playground or lawn to play the energy shortage game.

1. Use a string, stones or chalk (on asphalt) to outline a circle twenty feet in diameter. (the circle represents the whole earth)

2. Scatter a bag of navy beans unevenly (only a few in some places, many in other places) in the circle. (This is all the food on the earth)

3. Let half of the children go into the circle. (These are the people on the earth)

4. Count to ten. Each time you get to ten, each child can pick up a bean. This bean is the food (energy) they use to live.

5. Every time the children pick up beans, add one or two children to the circle. (New babies are born.)

6. When a child cannot find a bean before you count to four, they must leave the circle. (They died for lack of food.)

7. Continue until most of the children are out of the circle. (Food is scarce.)

Developing the lesson:

1. Ask, "Why did it get harder and harder to find food?" (more people, less food)

2. Ask, "What do we call it when there is less energy than people need?" (SCARCITY--energy is scarce)

Extending the lesson:

1. Discuss how people acted in the game:

   a. Did they cooperate (at first)?

   b. Did they compete? (yes)

   c. Were some people selfish? (yes)

2. Ask, "Do you think our game is like real life?"

3. Add to the class energy word list.

Materials:

1. Ball of string or chalk

2. 1 lb. bag of Navy beans

NOTE: If you have a large class, you should use a bigger circle and start with 3/4 of the class in the circle.

UNIT VII

1. Title: Transportation In My Life

Concept: Energy is used to move people from place to place.

Objective:

To give children the opportunity to discover the relationship between their needs for transportation and the energy supplied by their environment

Introducing the lesson:

1. Every day for a week, have each child keep track of all the things the family car is used for. If there are children in the class whose family do not have a car, have them keep track of any transportation used.

2. Make a list of all the different uses of transportation made by members of the class, (school, scouts, recreation, business, shopping, etc.)

Developing the lesson:

1. Draw a picture of yourself using transportation.

2. For each item on the class list of transportation uses, add the kind of energy used. (gasoline, body power, etc.)

3. Draw another picture of yourself using transportation if gasoline becomes very scarce and expensive.

4. Describe the two pictures you drew, explaining any differences between them.

5. Ask, "How would the social life of your family change if travel was restricted?"

Extending the lesson:

1. Ask the children to compare transportation by car and bicycle. Consider:

   a. safety

   b. energy used

   c. how far you can go

   d. anything else you want (air pollution, number of passengers, etc.)

2. Ask the children to list the things they do which require transportation that they:

   a. need

   b. could do without

3. Add to the class energy word list.

UNIT VII

2. Title: Energy Feelings

Concept: Energy use reflects the life-style of people.

Objective:

To give children the opportunity to discover the relationship between the life-styles and values of people and their use of energy

Introducing the lesson:

1. Put a large word ENERGY on the chalkboard or on a large sheet of butcher paper.
2. Ask the children to tell you words that describe energy. (pretty, ugly, hot noisy, windy, fun)
3. Put the children's words in a list.

Developing the lesson:

1. Ask the children to draw a picture showing how energy is pretty.
2. Have the children tell a story about their picture.
3. How have them draw an ugly cartoon about energy.
4. Have the children describe their cartoon.

Extending the lesson:

1. Ask the children to tell how they decided that energy was pretty or ugly.
2. Did all the class agree or did children have different ideas about what was pretty or ugly about energy? (Some people object to airplane noise; other drive to the airport to see and hear the jets take off.)
3. Read all the words on the class energy word list aloud together.

UNIT I

1. Title: Energy Being Used

Concept: People use energy to work and play.

Objective:

To discover the relationship between energy and work

Introducting the lesson:

1. Take the class outside and ask them to find different ways people are using energy and to make a list of the things the people were doing. (This may take a few minutes or as long as needed.)

Developing the lesson:

1. Back in the classroom, ask, "How many saw people working?" Make a list under work of all the "work" things children had on their list.

2. Now do the same for play, entertainment, anything else the children saw.

3. For each item on the work list, ask the children to suggest an energy saving way of doing it.

Extending the lesson:

1. Discuss the possible good and bad effects of using each energy-saving suggestion.

2. Ask, "How did you decide?"

3. Start a class energy word list.

UNIT I

2. Title: Energy Can Change Things

Concept: Energy is the ability to do work.

Objective:

To discover the relationship between energy and changes in the environment

Introducing the lesson:

1. Take the class outdoors to the playground, lawn or any area around the school building.

2. Tell the children that they have five minutes to find an example of something that is changing.

3. Ask them to return to where you are waiting as soon as they have found an example of change.

Developing the lesson:

1. On the chalkboard, make a list of the examples of change the children have found.

2. Group the examples in any way (natural, man-made, physical, chemical, growth, decay, life cycle, mechanical, etc.).

3. For each example, try to find what caused the change.

4. Ask, "Was energy used?" "What kind?"

Extending the lesson:

1. Ask the children to identify a change on their list that did not require energy. (can't)

2. Draw a picture of a change in the environment.

3. Explain your picture.

4. Add to the class energy word list.

UNIT II

1. Title: Food Has Energy

Concept: Energy can be stored.

Objective:

To discover the relationship between energy and plant and animal (organic) matter

Introducing the lesson:

1. Ask the children to find a way to show that food has stored energy. Do not help them.

2. Have each child (or groups) design an investigation to show that food has energy (their way). (be prepared to supply dishes of sand for burning things--nuts, any food can be burned)

Developing the lesson:

1. Have the children draw a picture proving that food has energy. (burning food)

2. Have the children describe their pictures.

3. Use old magazines to find pictures of animals eating plant parts (leaves, stems, bark, roots, seed, flowers, fruit, etc.).

4. Group the animals that eat certain plant parts.

5. Ask, "Why do the animals eat only parts of some plants?" (food stored there)

Extending the lesson:

1. Use food energy to heat something besides yourself.

2. Ask, "What parts of plants do people eat?" (parts with lots of stored food energy)

3. Look for news stories or pictures of food on fire, (grain elevators, etc.)

4. Use some "food for thought" (energy) to help someone who needs a mental lift.

5. Add to the class energy word list.

UNIT II

2. Title: An Energy Mobile

Concept: Animals depend on green plants for their energy (food).

Objective:

To give children the opportunity to discover the relationship between animal food (energy) and green plants

Introducing the lesson:

This lesson is a follow-up of the preceeding lesson: using pictures of animals eating plants to obtain the stored energy in them.

Developing the lesson:

1. Have the children construct mobiles with each arm representing animals that get their energy (food) from a plant part. For example, the seed eaters, the leaf eaters, etc.

2. Ask, "Are there any animals which could be used on more than one arm of the mobile?" (yes--omnivores like racoons and humans)

Extending the lesson:

1. Ask, "Are there animals which do not fit on the mobiles?" (yes--meat eaters)

2. Ask, "Can you trace the source of the energy in the food of the meat eaters (carnivores)?" (trace back to the plant which fed the animal eaten by the carnivore)

3. Ask, "What was the original source of all food energy?" (sun)

4. Add to the class energy word list.

UNIT III

1. Title: Getting Heat and Light

Concept: Energy comes in many forms.

Objective:

To discover that energy can be changed from one form to another

Introducing the lesson:

1. Turn off the lights.
2. Light a candle and let it burn for a few minutes.
3. Ask, "What kind of energy are we getting from the candle?" (heat and light)
4. Ask, "How did I get heat and light from the candle?" (changed chemical energy in wax to heat and light by burning)

Developing the lesson:

1. Ask the children to find other ways of changing something to get heat. (rotting, bending a nail, rubbing)
2. Ask them to do the same for light. (match, electricity)
3. Ask them to do something to get heat. (rub hands, jump up and down)
4. Ask them to do something to get motion. (move)
5. Ask them to do something to grow. (eat)
6. Ask, "In each case what have we done with stored energy?" (changed it to another form)

Extending the lesson:

1. Do an energy change movement. (dance)
2. Add to the class energy word list.

UNIT III

2. Title: Predict An Energy Change

Concept: Environments are in constant change.

Objective:

To discover the relationship between the work of people and changes in energy as it is being used

Introducing the lesson:

1. Take the class outdoors.
2. Ask them to find an example of an energy change they can predict. (Do not help them with suggestions.)

Developing the lesson:

1. Make a list of the energy changes which the children think they can predict.
2. For each item on the list, ask the children why they can predict an energy change. (car being started, child getting ready to run)
3. Ask, "What people can you think of who make their living predicting energy changes?" (weather forecaster, car mechanic, gardener building compost pile)
4. Add new ideas to the class list.

Extending the lesson:

1. Draw a picture of the changed energy being used.
2. Explain your picture.
3. Draw a picture showing energy forms and how they change.
4. Have the children explain how the energy forms changed in the drawings could be changed back again. (They can't; most of the energy used is gone forever.)
5. Add to the class energy word list.

UNIT IV

1. Title: I Can Enjoy The Sun's Energy

Concept: We get energy from the sun directly.

Objective:

To give children the opportunity to discover the relationships between the sun's energy (radiation) and things they enjoy (heat and light)

Introducing the lesson:

1. Write in large letters on the chalkboard, "I CAN ENJOY THE SUN'S ENERGY BY _____."

2. Read it aloud and ask the children to finish the sentence any way they wish.

Developing the lesson:

1. Ask the children to read their sentences.

2. Make a list of the ways children enjoy the sun's energy. (Did they mention heat, light, snow and rain, sunrise, sunset, moonlight, sunbathing, eating?)

Extending the lesson:

1. Ask if any children thought of a new way to enjoy the sun's energy after hearing the sentences of their classmates.

2. Ask the children to finish the sentences without using words.

3. Can they do a dance using two or more of the movements they developed to finish the sentences?

4. Add to the class energy word list.

UNIT IV

2. Title: The Sun's Energy Affects My Environment

Concept: The sun's energy can be used indirectly.

Objective:

To discover the relationship between the sun's energy and the environment--its air, soil and water

Introducing the lesson:

1. Review the preceeding lesson on enjoying the energy of the sun.

2. Remind the children that all the ways of enjoying the sun's energy were direct--from the sun to them directly.

3. Ask the children to finish the sentence: "I CAN BENEFIT FROM THE SUN'S ENERGY INDIRECTLY THROUGH _____." (my environment; its soil, water, air, plants)

Developing the lesson:

1. Discuss how the sun's energy helps us indirectly through:

   a. the air (climate, heat, seasons)
   b. the soil (growing crops, feeding animals)
   c. water (climate, swimming, home for wildlife)

2. Ask, "How do people use this indirect solar energy?"

   a. climate...tourist industry in Florida, recreation
   b. soil...winter vegetables, fruit
   c. water...swimming, fishing

Extending the lesson:

1. Draw a mural showing how people use the sun's energy indirectly and directly. (It is hard to separate the direct and indirect uses; for example, when you consider tourism.)

2. Investigate the local winter crops which are sent to colder parts of the U.S.--an indirect benefit of solar energy.

3. Ask the children how they can tell a direct use of solar energy from an indirect use. (evaluation--indirect is through the environmental effects of solar energy; direct is from the sun to people)

4. Add to the class energy word list.

UNIT V

1. Title: My Energy "Wants"

Concept: People use energy to satisfy their needs.

Objective:

To give children the opportunity to discover the relationship between their energy use and the things they want from their environment

Introducing the lesson:

1. Write a list of words on the chalkboard under the heading, "I want" (expensive car, banana split, motorbike, sailboat, a stereo, etc.)

2. Ask, "What are "wants?" (Things I'd like to have but may not need.)

Developing the lesson:

1. Ask each student to name one of their "wants"; list their "wants" on the chalkboard.

2. For each item on the list, discuss how it differs from a "need"--something they can't get along without.

3. Ask, "How would the "needs" of a modern family be different from the families of their grandparents?"

Extending the lesson:

1. Ask the children to describe some of their "wants" that have become "needs".

2. How did they decide? (values, life-styles)

3. Add to the class energy word list.

UNIT V

2. Title: I Waste Energy

Concept: People use more energy than they need.

Objective:

To give children the opportunity to discover that they are wasting some of the energy they use

Introducing the lesson:

1. Read a short newspaper article (or make up one) in which the President says, "We must all stop wasting our precious energy. Our nation's future depends on it." Say, "Our principal, Mr/Ms._____, has also asked us all to try to conserve energy here at school.

2. Ask, "How can we save energy?"

Developing the lesson:

1. Ask each student to list five things they do that waste energy. (do not help them)

2. Make a class list on the chalkboard.

3. Discuss how effectively energy could be saved if the students stopped doing the things on the list. (Would they have to give up "needs" or "wants"?)

Extending the lesson:

1. Ask the students to stop doing the things they listed as "energy wasters" that are not needs.

2. Find five ways they can each save additional energy.

3. Ask, "Is playing an example of wasting energy?" (No. Playing develops muscles and coordination.)

4. Make a list of the ideas generated and share it with other classes, parents, etc.

5. Add to the class energy word list.

UNIT V

3. Title: A Movement I Enjoy

Concept: People use energy to satisfy their needs.

Objective:

To give children the opportunity to discover the relationship between their use of energy and movement to express their feelings

Introducing the lesson:

1. Play a recording or tape of ballet music such as Tchaikovsky's "The Nutcracker".

2. Ask the children if the music makes them feel like doing an energy dance. (If it does, proceed with the lesson.)

Developing the lesson:

1. Ask the children to make a movement that seems to fit the music and suggests some kind of energy being used. (sun, wind, bird, water flowing--do not suggest; let the children create their own movement)

2. Ask if anyone has found a movement they enjoy which they would like to share with the rest of the class.

3. Let the others repeat the movement over and over until it becomes a dance.

Extending the lesson:

1. Have the children draw a picture of a friend doing the "energy dance".

2. Ask, "Where did the energy for the "energy dance" come from?" (the sun--food)

3. Add to the class energy word list.

Materials

Record or tape recording and record or tape player

UNIT VI

1. Title: Show How Energy Is Scarce

Concept: Energy supplies are limited by excessive demands for energy. SCARCITY.

Objective:

To discover the relationship between supply and demand for energy

Introducing the lesson:

1. Put up a bulletin board display of pictures showing hungry children, thin animals, people carrying wood for cooking, cars at gas stations during the oil embargo.

2. Write the word SCARCITY on the chalkboard or over the bulletin board display.

Developing the lesson:

1. Ask the children to look at the pictures on the board to tell you what SCARCITY might mean.

2. If you do not get a "supply and demand" answer, ask, "What was scarce in each picture?" (food, wood, gasoline)

3. Ask, "Why was each item scarce?" (limited supply, too many people, greedy people, too much demand for the item)

4. Show examples of energy scarcity in the school, home and community.

Extending the lesson:

1. Ask, "When is there a scarcity of an item?" (When the demand for the item is greater than the supply.)

2. Have the children suggest some things people might do to avoid scarcity of each item (food, wood, gasoline).

3. Have each child identify one thing they do which saves energy

4. Ask, "Would you be willing to share with children who are hungry?"

5. Add to the class energy word list.

UNIT VI

2. Title: Collect "Energy Crisis" Cartoons

Concept: Energy supplies are limited.

Objective:

To give children the opportunity to discover the relationship between people's values and their awareness of the energy "crisis"

Introducing the lesson:

1. Bring in one of two cartoons which relate to the "energy crisis" or to energy.

2. Discuss what a cartoon is and ask if the children can "get the message" which the cartoonist wanted to convey.

3. Ask the children to bring from home cartoons from newspapers, magazines and industry reports--any cartoons--relating to energy. (Be sure to have cartoons from both industry and environmental groups and cartoons showing differing values or biases.)

Developing the lesson:

1. At the end of the week, group the cartoons according to energy forms, supply, use, politics, etc.

2. Ask the children to determine the message and the values promoted in each cartoon.

Extending the lesson:

1. Ask the children to evaluate the effect of a cartoon compared to a news story.

2. Ask, "Why is a cartoon so good?" (usually funny, easy to read, has an easily understood message, etc.)

3. Ask the children to draw a cartoon relating to any energy question in which they have an interest. (the cost of candy?)

4. Add to the class energy word list.

UNIT VII

1. Title: Electricity In My Life

Concept: People are dependent on the environment for their energy.

Objective:

To give children the opportunity to discover the relationship between electricity use and their environment

Introducing the lesson:

1. Display pictures or show a film which deals with life in pioneer days.

2. Ask the children to make a list of the uses of energy they see in the pictures or film.

Developing the lesson:

1. Ask, "How did the pioneers heat their homes?" (wood stove or fireplace)

2. Ask, "What did they use for light?" (oil lamp, candles, fireplace...President Lincoln studying)

3. Ask, "What energy did they use to do their work?" (body energy; horse, mule, oxen, water wheel, windmill, etc.)

Extending the lesson:

1. Have the children compare their own use of electricity with the pioneers' energy use.

2. Compare electric use in their homes today with the homes of their parents and grandparents.

3. Do the same for recreation. (TV, Movies, radio, etc.)

4. Ask, "How has people's use of electricity affected the environment?" (air and water pollution, strip mined land, etc.)

5. Add to the class energy word list.

UNIT VII

2. Title: Moving Water

Concept: Water in motion has energy.

Objective:

To discover the relationship between water in motion and the energy it exerts

Introducing the lesson:

1. Show pictures of a surfer, a water wheel, a boat or raft going through the rapids, and any other pictures you can find which show water moving an object.

2. Ask, "What do all these pictures have in common?" (all show water moving something--that is, exerting energy)

Developing the lesson:

1. Ask the children to suggest some ways that water moves things. (hose, gutters, river)

2. Have the children draw pictures which show that water in motion has energy to do work.

3. Have them explain their picture to the class.

Extending the lesson:

1. Use the energy of moving water to do something.

2. Ask, "Why did people stop using water power?" (it was cheaper and easier to use electricity)

3. Ask, "Could we use water power again?" (yes, in some places for some things.)

4. Add to the class energy word list.

UNIT I

1. Title: Energy in My Life

Concept: Energy is the ability to do work.

Objective:

To give children the opportunity to discover the relationships between their use of energy and their movements, growth and comfort

Introducing the lesson:

1. Ask the children to keep a record of all the energy they use for a week and the purpose for which the energy was used. (It is not necessary to count calories in food or units of fuel. However, it will be a more complete record if they record: "1 hamburger, small fries, glass of milk" rather than "lunch."

2. Have each student make a summary of each kind of energy used--food, beverages, electric appliances, heating or cooling, lighting, radio, TV, hi-fi, automobile miles (gallons of gas), transportation, etc.

Developing the lesson:

1. Make a class summary for each use.

2. Estimate energy use for the school. (Class use) X number of classes--or use class as percentage of school population)

3. Identifying big "energy spenders", small "spenders".

4. Go through the class lists and identify energy used for needs, wants, and luxuries.

Extending the lesson:

1. Record number of times refrigerator doors were opened by members of the class for a week!

2. Identify instances of energy waste.

3. Plan a program to cut down energy waste.

4. Compare energy use by the class with a class of twenty years ago; fifty years ago.

5. Start a class energy vocabulary--words relating to energy that are used in the lesson.

UNIT I

2. Title: "ENERWORDS"

Concept: Energy is the ability to do work.

Objective:

To develop a vocabulary of energy-related words

Introducing the lesson:

1. Ask the children to save the newspapers from their homes for a week or until you have collected enough papers so that each child has a paper.

2. Hand out the papers, asking the children to circle all the words relating to energy--the "ENERWORDS."

Developing the lesson:

1. Keep a record of the number of "enerwords" used during the week.

2. Make a list of the topics covered in the news stories.

3. Investigate which section of the papers has more information about the use of energy to do work, move things, make things grow, heat and cool, etc. (business, general, local news, food, sports sections).

Extending the lesson:

1. Go to the newspaper office with the class and compare the number of "enerwords" with the papers for the same date one year ago; ten years ago.

2. Check some early papers.

3. Find a cartoon which uses an "enerword" as its subject or to tell its story.

4. Have the children invent new "enerwords" using combinations of words from their lists of "enerwords."

5. Write a story describing the world ten years from now using their new "enerwords."

6. Have the children tell their story to the class.

7. Start a list of class "enerwords" using the "enerwords" found in the papers which relate to their own use of energy.

UNIT II

1. Title: Stored Energy

Concept: There are many forms of energy.

Objective:

To discover the relationship between matter and the energy which may be stored in it

Introducing the lesson:

1. Blow up a balloon. Let it go and watch it jet around the room.
2. Ask, "Was there energy stored in the hot air of the balloon before I let it go?"
3. Ask, "What other kinds of matter have stored energy in them?" (foods, fuel)

Developing the lesson:

1. Make a list of the kinds of matter which the children suggest.
2. Ask the children to divide the items on their list into three forms of matter--solid, liquid, or gas.
3. Now make a list for each. (gas--natural gas, hydrogen, oxygen, steam; liquid--liquified gases, oils; solid--coal, wood, uranium, candle, battery)
4. Determine a use for each.

Extending the lesson:

1. Ask, "What is a fossil fuel?" (stored energy in a fossil--a once living thing that has been buried in the earth)
2. Investigate the formation of fossil fuels--coal, oil, and gas.
3. Investigate the energy value of various fossil fuels.
4. Draw a picture of a stored energy being used.
5. Tell the story of your picture.
6. Add to the class "enerword" list.

UNIT II

2. Title: Food or Fuel?

Concept: Organic matter contains stored energy

Objective:

To recognize the relationships between foods and fuels and the living things which use them to supply energy

Introducing the lesson:

1. Hold a half of an English walnut on the end of a piece of insulated wire or a wooden-handled needle.

2. Light the walnut with a match.

3. Hold the burning walnut under a Pyrex test tube half full of cold water which is held in your other hand (or by a student) with tongs.

4. When the water starts to boil ask, "Is the walnut we are using here a food or a fuel? (A fuel--man is the only living thing which uses fire. Other living things would use the walnut only as food. Man also uses walnuts as food.)

Developing the lesson:

1. Ask, "What happened to the walnut?" (It was burned up.)

2. Ask, "Why did I burn the walnut?" (To release its energy as heat and light.)

3. Discuss the similarity between what happens to the walnut as fuel (it combines with oxygen to release energy as heat and light) and as food (it combines with oxygen which we breathe to release energy for growth and heat to keep the body warm). In both cases, the stored energy is "burned up."

Extending the lesson:

1. Ask, "What is the difference between a food and a fuel in terms of energy?" (none)

2. Investigate fuels which humans cannot use as foods. (coal, wood--man cannot digest)

3. Ask, "How would your view of a walnut differ from that of a squirrel?" (the squirrel would not use it as a fuel for a fire--only a fuel for its body or food.)

4. Ask the students to make a list of animal foods used as fuel by humans. (wood, grass, oil from plants-animals)

5. Add to the class energy word list--"ENERWORDS".

Materials:

walnut, tongs, needle, test tube, sand-filled pie plate for burning, matches

UNIT III

1. Title: Change Energy to Move Something

Concept: Energy can be changed from one form to another.

Objective:

To discover the relationships among the various forms of energy

Introducing the lesson:

1. Ask the children to use some energy to move something. (Do not help them or comment on what they are doing until they have all moved something.)

2. Make a list of the things moved by the children.

Developing the lesson:

1. Divide the listed activities into categories. (body movements, fans, push, pull, lift, drive, etc.)

2. For each type of movement, discuss what kind of energy was used and how it was changed to make something move. (food for movement or to do work, fan to blow paper, electricity to move fan, etc.)

3. Ask, "How was energy lost in each activity?" (heat given off and lost)

Extending the lesson:

1. Create a movement which shows energy being used that is not body energy. (wind, light, heat)

2. Draw a picture of yourself changing energy to move something.

3. Explain your picture.

4. Write a sentence describing an energy change.

5. Add to the class energy word list--"ENERWORDS".

UNIT III

2. Title: Lost Heat

Concept: Energy loss can be reduced by using insulation.

Objective:

To discover the relationship between energy loss and insulation

Introducing the lesson:

1. Take the class on a survey tour of the school to find examples of heat or air conditioning energy being lost. (Do not help the students or make any suggestions.)

2. Ask each student to quietly make a list of the examples found.

Developing the lesson:

1. Make a class list of examples of heat energy loss. (This should include loss of heat through windows, doors, uninsulated pipes, hot water use and waste.)

2. For each item on the class list, have the students suggest how the waste could be eliminated or reduced. (by insulation)

3. Now take the class outside and look for more examples of heat energy being lost or wasted.

4. Ask, "How could the lost energy be restored?" (It cannot. Heat energy lost is gone forever.)

Extending the lesson:

1. Find examples of efforts to get rid of heat energy. (fan to cool auto engines; cooling tower in electric power plant; exhaust fan in kitchen, etc.)

2. Draw a picture of heat energy being lost.

3. Describe your picture.

4. Evaluation: Use the word "insulation" in a sentence or short story.

5. Add to the class energy word list--"ENERWORDS."

UNIT IV

1. Title: Animals Use Solar Energy

Concept: The sun is a source of (heat) energy.

Objective:

To discover the relationships between animal lives and the sun's energy

Introducing the lesson:

1. On a bright sunny day, take the class outdoors to look for examples of how living things use solar energy directly. (Do not help the students or make suggestions.)

2. Have each student make a list of the examples found.

Developing the lesson:

1. Make a class list of the examples of direct use of solar energy observed. (The list should include uses of sunlight--to see, help green leaves make food, etc; and sun heat--to warm bodies, etc.)

2. Ask, "How has nature designed living things to collect solar energy?" (leaves broad and flat; tree branches spread out; animals darker colored on top; water animals, turtles and snakes designed to crawl on logs for sun baths, etc.)

3. Draw a picture showing how man has designed things to use solar energy directly.

4. Describe your picture.

Extending the lesson:

1. Investigate how cold-blooded animals use solar energy in reproduction. (Snake and turtle eggs are laid in sand which is warmed by sun. Alligators lay their eggs in piles of grasses and mud. The heat from the sun speeds up the decay of the grasses and produces heat to incubate their eggs.)

2. Use some art form to describe an animal's use of solar energy.

3. Ask, "How are people like other animals in their use of solar energy?" (sun bath, etc.)

4. Investigate the dangers to the eyes and skin from too much solar energy. (sunburn, cancer, blindness)

5. Add to the class energy word list--"ENERWORDS."

UNIT IV

2. Title: A Sun Dance

Concept: The sun is a source of energy.

Objective:

To give children the opportunity to express their feelings about the sun's energy

Introducing the lesson:

1. Take the class outdoors to the playground. Ask them to just relax in the sun in any way they wish--sitting, standing, walking, running--but without communication with one another.

2. After about 10 or 15 minutes, ask them to invent a movement which seems to express a feeling about the sun's energy.

Developing the lesson:

1. After everyone (who wishes to) has found a movement which expresses a feeling about solar energy, ask individuals to show their movement to the class.

2. Ask the class to guess what feeling is being expressed; then have the demonstrator identify the feeling expressed in the movement.

3. If there is a movement which many seem to like, have the "inventor" of the movement teach it to the others.

4. They have created a solar-energy dance.

Extending the lesson:

1. Have the students describe the feeling which they expressed by movement with words.

2. Discuss with the class why it is sometimes easier to express a feeling by a movement instead of words.

3. Extend the dance by combining two or more of the individual movements.

4. Try to find some music which fits the dance.

5. Ask, "Where did the energy to do the solar-energy dance (or movement) come from?" (the sun, by way of our food and green plants)

6. Add to the class energy word list.

UNIT V

1. Title: Appliances In My Home

Concept: People use energy in appliances to do their work.

Objective:

To give children the opportunity to discover the relationship between their life-styles and their use of energy for appliances

Introducing the lesson:

1. Have each student make an inventory list of all electric appliances in their home.

2. For a week, have them keep a record on their inventory list of electric appliances used, for what, and for how long. (i.e.--toaster, to toast bread, 2 minutes)

Developing the lesson:

1. Make a class list of appliances and the number of each used.

2. Put a mark beside each appliance that was used by all members of the class. Ask, "Does this mean that these appliances are needed?" (perhaps; or only that they are very popular)

3. Total the time of use by the class for each appliance and rank them according to the amount of use.

4. Discuss those uses students could or would do without to conserve energy.

Extending the lesson:

1. Ask each student to list the three appliances on the list that they would keep if they could have only three. (values)

2. Ask, "Does our number one rating for our most used appliance mean that it is "needed"? (discuss)

3. Compare the class list of appliances with one for another culture--Eskimo, Indian, Chinese.

4. Do the same for an earlier generation.

5. Draw a picture of yourself using your favorite appliance.

6. Add to the class energy word list--"ENERWORDS."

UNIT V

2. Title: "Wants" Become "Needs"

Concept: People use energy to satisfy their needs.

Objective:

To give children the opportunity to examine and evaluate their use of energy

Introducing the lesson:

This lesson should follow the preceeding lesson on the use of electric appliances, which will serve as an introduction.

Developing the lesson:

1. Now that you have done an inventory of your use of electric appliances, during the week keep a record of your use of all kinds of energy. (food, fuel, transportation, recreation, work, etc.)

2. Make a class list of kinds of energy use, purpose for which energy was used, and for how long energy was used.

3. Rank the uses of energy from "most used" to "least used."

4. Ask, "Is there another way to rank our use of energy?" (cost, scarcity, need, etc.)

Extending the lesson:

1. Go through the purposes for which energy was used and evaluate them as "necessary", or "could do without".

2. Ask, "How many of the uses listed under "could do without" could or would you (the members of the class) be willing to do without to conserve energy?"

3. Discuss the differences between "needs" and "wants".

4. Ask, "When does a "want" become a "need"?"

5. Draw a picture of yourself in a world with all the energy you wanted.

6. Add to the class energy word list--"ENERWORDS".

UNIT V

3. Title: A Picture of Energy Being Saved

Concept: Energy supplies can be saved.

Objective:

To give children the opportunity to discover ways to save energy

Introducing the lesson:

Ask the students to draw a picture of energy being saved. (Do not help or suggest in any way.)

Developing the lesson:

1. Ask the students to identify the energy-saving (conservation) methods suggested in each picture.
2. During the discussion, ask for suggestions for other or better ways to conserve energy.
3. Try them out!

Extending the lesson:

1. Design a sign which will urge the public to conserve energy.
2. Make the best (by class vote) sign into a public service advertisement.
3. Get your local newspaper or TV station to show your advertisement.
4. Design an energy conservation plan for your school.
5. Get your principal to implement your plan.
6. Many small car owners are showing bumper stickers which say: "I'm saving gas." Ask the students to discuss this bumper sticker's message (Pro--"They are certainly using less gas then if they were driving a bigger car"; Con--"Can you save gas while using it?" or "Is the owner of a private jet airplane conserving gas when he uses a large luxury car instead?")
7. Prepare "spot" energy announcements for use over the school's P.A. system.
8. Add to the class energy word list--"ENERWORDS".

UNIT VI

1. Title: Is There An Energy "Crisis"?

Concept: Energy supplies are limited.

Objective:

To evaluate the energy "crisis" in terms of supply, demand, cost

Introducing the lesson:

1. Ask the students to bring in advertisements that seem to encourage greater use of energy (for one week).

2. Without comment, place them on the bulletin board.

3. During the week, have the students investigate the events of the oil embargo of 1973 and the resulting energy "crisis".

   a. causes (Mid-east war)
   b. effects (gasoline shortages, increased prices)
   c. reaction of society in the U.S. (hoarding)

Developing the lesson:

1. Calculate the amount of gasoline which could be "hoarded" if each car's tank was filled by an anxious (and selfish) owner. (15 gallons X 8 to 10 million cars)

2. Discuss the reactions of "hoarders".

3. Look for evidence that people are aware of the energy "crisis" in school (is there a conservation plan?), home (is there a conservation plan?), community, state, nation.

4. Look for evidence to the contrary. Are sales of big cars increasing? Are boat sales up? Etc.?

Extending the lesson:

1. Look for changes in industry advertisements as a result of the energy "crisis". (mention of lower energy use--"efficiency"; do-it-yourself ads; an oil that saves gasoline)

   a. changing energy supplies (switch to gas or coal)
   b. changing demands of people (look for low energy ads; solar, etc.)

2. Draw a picture of yourself in an energy "crisis" (car out of gas)

3. Design a picture of yourself using an alternative energy source. (bicycle passing a stalled car)

4. Add to the class energy word list--"ENERWORDS".

UNIT VI

2. Title: Running Out of Body Energy

Concept: Energy supplies are limited.

Objective:

To discover that humans can also have an energy "crisis"

Introducing the lesson:

1. On a cloudy Monday morning, say, "I think I have run out of body energy."

2. Ask, "Is there anyone else in the class who has run out of body energy"?

3. Ask, "How can a body run out of energy or be tired?" (not enough food; not enough oxygen to "burn" the food and release energy; not enough rest to restore muscle energy)

Developing the lesson:

1. Ask the students to look in periodicals, magazines, and papers for stories and pictures of people running out of body energy. (Do not help! Pictures should include workers, athletes, mountain climbers, children playing.)

2. Group the pictures according to type of activity.

3. Investigate feelings of mountain climbers running out of energy.

   a. How did they restore their energy supplies?
   b. How much weight did they lose?

Extending the lesson:

1. Have the students make an historical record of climbs on Mount Everest, Mount McKinley (Denali), The Matterhorn, and The Eiger.

2. Ask, "Why is oxygen used?" (to speed up oxidation--"burning"--out of body energy supplies; or at high altitudes where oxygen supplies are limited, to make sufficient oxygen available)

3. Investigate the problems of keeping up body temperatures in the Antarctic.

4. Draw a picture of yourself running out of energy.

5. Add to the class energy word list--"ENERWORDS".

UNIT VII

1. Title: Plants Store Energy

Concept: Living things are interdependent with their environment.

Objective:

To discover the relationship between animal food and plant energy storage

Introducing the lesson:

Ask the students to list all the plant parts they have eaten during the past week. (They should mention every part.)

Developing the lesson:

1. Find an animal that uses each of the plant parts listed by the class for food.

   a. leaves--(lettuce)--rabbits, insects

   b. buds--(asparagus)--deer, grouse, squirrels

   c. stem--(celery)--insects

   d. bark----------beaver

   e. root--(carrot)--horses, nematodes

   f. flower--(cauliflower, broccoli)--insects

   g. seed--(peas, beans, peanuts)--birds, mice

   h. fruit----------birds, mammals

   i. sap--(maple syrup)--sapsucker

2. Find an animal that eats all parts. (human, raccoon)

Extending the lesson

1. Find a plant that does not store energy. (nongreen plants--fungi)

2. Have the students plan a "vegetarian" menu which uses every plant part.

3. Draw a picture of a vegetarian. (man or other animal)

4. Add to the class energy word list--"ENERWORDS".

UNIT VII

2. Title: Energy Use Affects My Environment

Concept: Energy use affects everyone.

Objective:

To give children the opprotunity to discover the relationship between energy use and environmental effect and their feelings about it

Introducing the lesson:

1. Ask the students to draw a picture which shows how their own use of energy affects their environment.

2. Have students describe their pictures.

Developing the lesson:

1. Using the class pictures and descriptions, make a list of the uses of energy by the class and the environmental effects of that use. (car--air pollution; electricity--nuclear waste, thermal heating and cooling--strip mining, etc.)

2. Draw a picture showing how energy use affects you at home.

3. Do the same thing showing you at school.

4. Do the same thing showing you on vacation.

Extending the lesson:

1. Describe your pictures.

2. For each effect on you or your environment, discuss how it can be eliminated or lessened.

3. Ask, "What is the environmental effect of littering?" (waste of materials and the energy to replace them; aesthetic effect; cost of clean-up, etc.)

4. Find something about energy use that makes you feel:

   a. good b. bad c. terribly upset d. who cares?

5. Draw a picture or cartoon showing how you feel.

6. Describe your picture.

7. Add to the class energy word list--"ENERWORDS".

UNIT I

1. Title: Energy In My Environment

Concept: Energy is used to do work

Objective:

To give children the opportunity to discover energy being used in their environment to do work- to move things, heat things, make things

Introducing the lesson:

Ask the students to make a list of ten objects in their environment which they use or observe regularly. They may want to go out on the school grounds, but they should be able to make their list from memory. "In their environment" means that the thing affects their lives in some way.

Developing the lesson:

1. For each item on their list, ask the students to investigate what kind and how much energy is used to make it. (answer may involve energy used in production, packaging, delivery, etc.)

2. For each item, ask the students to suggest an alternative which will require less energy.

3. Now investigate the energy required to use each item on the list.

4. Suggest alternatives which require less energy for their use. (a bicycle instead of mother's car for transportation; a hand toothbrush; a towel to dry hair)

Extending the lesson:

1. Make a class list from the student lists.

2. Identify the ten objects listed most often and indicate whether they are high energy users or low energy users.

3. Ask, "Is body power always a good substitute for energy being used?" (In our society, there are many things that we can no longer do with body power. grow our food, etc.)

4. Investigate how energy is used to get rid of your ten items after they have been used or worn out. (recycling in some cases is more expensive than using new raw materials-paper, bottles, etc.)

5. Draw a picture of yourself with your ten "things".

6. Describe your "environment" in terms of energy use.

7. Create a dance or find pictures of dancers that illustrate five kinds of energy.

8. Collect music that says something about energy.

9. Start a class energy word list--a vocabulary of "ENERWORDS".

UNIT I

2. Title: Making Things Move Faster

Concept: Energy is used to do work.

Objective:

To discover the relationship between amounts of work done and energy used - more energy is required to do more work.

Introducing the lesson:

1. Take the class outside the school. Ask a volunteer or two (boy and girl) to bring their bicycles to the study area.

2. Ask the students to ride very slowly around the campus in front of the class, using both sidewalk and lawn or unpaved area.

3. Have the other students check the riders' appearance when they return. (hot, out of breath, etc.)

Developing the lesson:

1. If the bicycle owners are willing, let other students ride the "course", at first slowly, then very fast.

2. Ask the students to compare the appearance of the riders going slowly with that of the riders going fast. (there will be considerable difference in breathing rate and expressions of "tired", "out of breath", etc.)

3. Ask, "What do we have to do to move things faster?" (use more energy)

4. Now look for twenty things being moved and discuss how each could be made to move more rapidly.

5. Ask, "Was there any difference in the amount of energy used in riding on the pavement and on the rough surface?" (roads are paved to reduce friction as well as to provide a smoother ride.)

Extending the lesson:

1. Ask the students to move something without using any energy. (they cannot)

2. Investigate whether energy is needed to make something stop moving. (try to stop the bicycle - from behind, not in front of it)

3. Ask the students to sit for a few minutes and not use energy. (They will find it impossible. Some energy use in their bodies is not under their control.)

4. Draw a picture of yourself trying to do nothing.

5. Describe yourself doing nothing.

6. Add to the class energy word list - "ENERWORDS".

UNIT II

1. Title: Energy Flow In My School

Concept: Energy comes in many forms.

Objective:

To give students the opportunity to discover the relationship between energy supply and energy use in their school

Introducing the lesson:

1. Take the class on a tour of the school grounds and the service area where the utility lines enter the buildings, and where oil or gas are stored.

2. Make a small map of the campus showing the flow of energy into the school.

Developing the lesson:

1. Paste your school energy flow map in the middle of a large piece of paper or on the chalkboard.

2. Add the facilities, structures, etc., that are necessary to get the energy from its source to the school. (water, oil, gas, electricity. This should include the local power plant and the source of the fuel used to run it.)

Extending the lesson:

1. Discuss the energy flow out of your school. Ask, "What energy leaves the school?" (heat, light, and, most important, brain energy and its products - information and knowledge)

2. Ask, "Do we get a greater energy return from the money spent for utilities or instruction?"

3. Discuss the brain energy flow.

4. Draw a picture of the brain energy flow into and out of the schools.

5. Design an energy conservation plan to reduce the flow of energy into the school.

6. Put it into effect!

7. Add to the class "ENERWORD" list.

UNIT II

2. Title: Make A "Sense Chart"

Concept: Environments are in constant change.

Objective:

To give students the opportunity to discover their awareness of energy in their environment

Introducing the lesson:

1. Ask the students to give an immediate response with an "ENERWORD" they think of when you say a word. Ask one student to record the "ENERWORDS".

2. In rapid order, or as quickly as you get a response, say:

   a. "sight" - (smoke, light, traffic, movement, etc.)
   b. "sound" - (motor, wind, traffic, movement, etc.)
   c. "smell" - (cooking, toaster, burning, smoke, candy, etc.)
   d. "touch" - (wood, coal, hot, cold, oil, food, etc.)
   e. "taste" - (candy, oil, nut, sweet, sour, etc.)

3. Repeat the list of the five principal senses until you have a good list of "ENERWORDS" which relate to the senses.

Developing the lesson:

1. Make a class list of "ENERWORDS" which were suggested for each of the senses.

2. Have each student make a visual chart of how all their senses interact with energy.

3. Have the students describe their chart.

Extending the lesson:

1. Find the energy words which were suggested by more than one of the senses.

2. Find the energy words which were suggested by all of the senses. (food cooking)

3. Design another "sense chart" showing yourself reacting to some energy source in your environment.

4. Now do the same for an energy use.

5. Describe your "sense charts".

6. Add to the class energy word list.

UNIT III

1. Title: A Food Energy Chain

Concept: Energy can be changed from one form to another.

Objective:

To discover the relationship between food energy and the living things which use it to move, grow, and reproduce

Introducing the lesson:

1. On the chalkboard, put a list of the food items in a typical breakfast - ham and eggs, toast, juice and milk or coffee.

2. Ask the students to trace the energy in their breakfast back to the sun, listing each living thing through which it passed on its way to the breakfast table.

3. Say: "This is a food energy chain."

Developing the lesson:

1. Read the class list and ask each student to name a wild animal as their name is called.

2. Ask the students to develop a food energy chain for the wild animal they name. (some will eat green plants directly: squirrel - acorn - oak tree - sun; other which eat other animals will have longer food energy chains: owl - squirrel - acorn - sun)

3. Have the students identify the wild animal with the longest food energy chain. (one of the predators like the panther: otter - fish - worm - soil fungus - green plant - sun.)

Extending the lesson:

1. Develop a food energy chain which starts with:

   a. a cereal
   b. a water plant
   c. a tree

2. Investigate the "endangered species" of wildlife that live in your area. (panther, Everglades kite, crocodile, manatee, etc.)

3. Ask, "Why are these animals in danger of extinction?" (loss of food energy sources, shelter, poisons)

4. Ask, "Is there any relationship between energy transfer in food energy chains and pesticide transfer?" (Yes. Pesticide residues on plants are transferred to the animals which eat them as food, and are concentrated in the animals at the top of the food energy chain - birds, fish, mammals.)

5. Draw a picture of yourself in the midst of your favorite food energy chain.

6. Let the class guess the favorite foods of each class member from the pictures.

7. Compare the food energy use of people who eat mostly cereals with those who eat large amounts of meat.

8. Add to the class energy word list.

UNIT III

2. Title: People Store Energy

Concept: Some forms of energy can be stored for later use.

Objective:

To discover the relationship between energy forms and energy storage by people

Introducing the lesson:

1. Light a candle or an alcohol lamp.
2. Let it burn for a while, until the burning has stimulated several of the senses.
3. Ask one of the students to investigate whether heat energy is being given off.
4. Ask, "What is the source of the heat and light energy in the candle?" (wax - stored plant oils)

Developing the lesson:

1. Find evidence of stored energy in the classroom, school building, and on the school grounds. (food, batteries, water pressure, candles, seeds, fuel tanks, etc.)
2. Go out and find people storing energy.
3. Make a list of what you found.
4. Investigate how people use stored energy as power.

Extending the lesson:

1. Prove that there is energy stored in:
   a. the water behind a dam. (build one!)
   b. a battery (light a flashlight, start a motor)
   c. food. (burn it)
   d. a fuel (burn it)
2. Find out how other animals store energy.
3. Investigate how plants store energy. (as fat oils, carbohydrates, and proteins, stored in the part of the plant people use as food.)
4. Draw a picture of stored energy being used:
   a. to make electricity (coal, oil, water power)
   b. to move something (water wheel)
5. Add to the class energy word list.

UNIT IV

1. Title: The Sun's Energy Affects People

Concept: The sun supplies most of the earth's radiant energy.

Objective:

To discover the relationship between solar energy and the life-styles of people

Introducing the lesson:

1. Write on the chalkboard: "The sun supplies most of the earth's radiant energy."

2. Ask the students to write out their reasons why they agree or disagree with the statement.

Developing the lesson:

1. Discuss with the students their reasons for agreement with the statement. (all stored food energy, wood, and forage is stored by green plants using solar energy directly. All of our fossil fuels were stored by green plants and animals who ate green plants living ages ago and are now buried in the earth's rocks, so they are indirectly supplied by solar energy - for example, coal, natural gas, and oil.)

2. Discuss reasons for disagreement (large amounts of water power, nuclear power, and geothermal power (from the hot interior of the earth.)

3. Ask the students to list the sources of energy which are not solar. (nuclear, geothermal, water power)

4. Ask, "How about wind power?" (wind is air moving because of uneven heating by the sun over different parts of the earth)

Extending the lesson:

1. Investigate the major ocean currents.

   a. warm - moving from the equator
   b. cold - moving from the poles
   c. both resulting from uneven solar heating over different parts of the earth

2. Draw a picture of yourself or a friend enjoying some solar energy:

   a. directly (sunbath)
   b. indirectly (sailing)

3. Investigate the reasons why people do not use more direct solar energy instead of scarce and costly fossil fuels. (Until very recently, fossil fuels were cheap and in good supply. Also we lack the technology to use solar energy directly. In the future, more and more solar energy will be used.)

4. Add to the class energy word list.

UNIT IV

2. Title: Green Plants Use The Sun's Energy

Concept: Green plants use solar energy to make food.

Objective:

To discover the relationship between the green plants, the sun, and the earth's food supply.

Introducing the lesson:

Ask the students to design an investigation to show that green plants use solar energy to make food. (Refer to you science text.)

Developing the lesson:

1. Carry out the student investigations. (Be prepared with a few packets of vegetable seeds and some pots.)
2. Design an investigation that can be done with a plant growing on the school grounds.
3. Find a way to help your green plants make and store food energy. (mini-greenhouse)
4. Try to grow a green plant in the dark.
5. Ask, "How can mushrooms grow in the dark?" (They live on dead remains of former green plants.)

Extending the lesson:

1. Investigate the needs of green plants for direct sunlight. (Compare plants in sunny and shady areas.)
2. Have the students tell the story of their experimental green plant and solar energy.
3. Investigate the needs of plants for water. (used to make food when combined with carbon dioxide, using the sun's energy)
4. Draw a picture of a world without green plants.
5. Describe your picture to the rest of the class.
6. Add to the class energy word list.

UNIT V

1. Title: My "Dream World"

Concept: People use energy to satisfy their needs and "wants".

Objective:

To discover the relationship:

a. between energy use and people's needs and "wants".
b. between a "dream world" and high energy use.

Introducing the lesson:

1. Ask the students to draw a picture of themselves in their "dream world".

2. Play a recording the "The Big Rock Candy Mountain".

Developing the lesson:

1. Have the students describe their "dream world" as shown in their pictures.

2. List the items shown in the "dream worlds" of the class.

3. Have the students classify each item on the class list as a high energy or a low energy user. (gasoline and electricity or body power)

Extending the lesson:

1. Describe the relationship between life-styles of people and their needs, wants, and dreams.

2. Now draw a picture of a child in India in their "dream world".

3. Ask, "How is the "dream world" of a hungry child like the dream of the hobo in "The Big Rock Candy Mountain?"

4. Describe the effect on your "dream world" of a shortage of:

   a. electricity
   b. gasoline
   c. food
   d. sunlight

5. Write a short paragraph describing how you would reach your "dream world".

6. Add to the class energy word list.

Materials:

record - "The Big Rock Candy Mountain"

UNIT V

2. Title: An Energy Tour Of My Community

Concept: People use energy for community needs.

Objective:

To give students the opportunity to discover the many uses of energy in their community

Introducing the lesson:

1. Plan with your class an energy tour of your community.
2. Ask, "What places would we need to visit to study energy supply?" (power plant, big coal, oil, and natural and bottled gas distributors, water company, etc.)
3. Ask, "What places would we need to visit to study energy use?" (the total community - homes, offices, factories, power plant, etc.)

Developing the lesson:

1. Go on the energy tour if you can.
2. If you cannot go on the tour, use a community map to take a make-believe tour.
3. Make a map, or show on the community map, the energy flow into and out of the community. (You may want to review the tour of the school on page 91, Unit II, Grade 5.)
4. Trace the source of the energy coming into the community. (oil from Venezuela, Texas, La., or Arabia; coal from West Virginia, etc.)

Extending the lesson:

1. Locate the big energy users in your community.
2. Locate the small energy users.
3. Invent a plan for making the big energy users into small energy users without putting them out of business.
4. Visit the power plant which supplies electricity to your community.
5. Ask the students to investigate how the power plant uses the waste heat from its electric generators. (This is usually wasted in the air or the "cooling" water of a river or ocean.)

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6. Investigate the amount of energy used to supply energy. (It takes more energy to produce food in the U.S. than the food contains.)

7. Find an example of energy being used to make a good change and a bad change in your community.

8. Ask, "How did you decide?" (values)

9. Add to the class energy word list.

UNIT VI

1. Title: Energy Scarcity

Concept: Energy supplies are limited.

Objective:

To discover the relationship between energy supply and demand which results in scarcity

Introducing the lesson:

1. Announce to the class that due to the scarcity of gasoline there will be no school buses next week.
2. Ask, "How much gasoline would we save by not using the school buses?" (You will get wild guesses)
3. Ask, "How could we find out?"

Developing the lesson:

1. Find out how many miles school buses travel each day.
2. Find out how many gallons of gasoline the buses use each day.
3. Calculate the number of miles travelled for each gallon of gas.
4. Ask, "Why do different buses get different miles per gallon of gasoline?" (more efficient engines, better drivers)

Extending the lesson:

1. Draw a picture of your community without gasoline.
2. Describe your picture.
3. List the machines that could not be used.
4. Ask the students to suggest a better energy-saving practice than not using school buses. (It is better to use buses than private cars.)
5. Have the students calculate how much gasoline it would take if they came to school in private cars.
6. Compare the results with the use of gasoline by buses.
7. Have each student write a short paragraph describing a scarcity of energy that they have experienced.
8. Add to the class energy word list.

UNIT VI

2. Title: Florida - A Consumer State

Concept: Energy supplies are limited.

Objective:

To discover the dependence of states without fossil energy sources on other areas of the nation and the world for their energy supplies

Introducing the lesson:

1. Bring in some pictures of oil exploration and drilling in the Big Cypress or other areas of Florida.

2. Investigate the amount of oil produced in Florida every day. (5.4 million gallons)

3. Find out how much oil is used in Florida every day. (28.2 million gallons)

Developing the lesson:

1. Ask, "Is Florida an energy producing state?" (Yes)

2. Ask, "Is Florida an energy consumer state?" (Yes)

3. Calculate the amount of oil Florida must import each day. (22.8 million gallons) each year (365 days x 22.8 million gallons)

4. Investigate where the oil imported into Florida comes from. (Venezuela)

Extending the lesson:

1. Locate states in the USA which produce more oil than they use. (Alaska, La., Texas)

2. Locate nations with surplus oil supplies. (Venezuela, Mexico, Arab states, Russia)

3. Trace the routes which oil tankers would take to get oil from these nations to Florida.

4. Discuss the danger to Florida's economy and people of an oil shortage or embargo.

5. Investigate the alternatives to the use of oil. (coal and nuclear power plants; solar heating; no substitutes for gasoline at present)

6. Draw a picture of your section of Florida without oil.
7. Do a similar study for coal, natural gas, food.
8. Add to the class energy word list.

UNIT VII

1. Title: A Letter To The Editor

Concept: Modern life-styles in the USA are dependent on energy supplies in unlimited quantity at a reasonable cost.

Objective:

To discover the relationship between energy use and life-style or standard of living

Introducing the lesson:

1. For a week or so before doing this lesson, collect "letters to the editor" in your local newspaper which relate to energy in any way.
2. Read the letters to the class.
3. Ask, "What energy problems are people concerned about?"

Developing the lesson:

1. Ask the students to write a letter to the editor about any energy topic they wish.
2. Tell the students that TV has been banned in order to save electricity. Ask them to fantasize their lives without TV and write a letter to the editor describing their new life-style without TV.
3. Ask the students to estimate the energy costs of their alternate activities.

Extending the lesson:

1. Trace the history of energy use in the USA. (solar animal, water, wind, steam, fossil, nuclear)
2. Create a picture or cartoon which tells the same story as your letter to the editor.
3. Make a list of all the words the class can think of which represent energy waste.
4. Use the energy waste words to write a plan for energy conservation.
5. Add to the class energy word list.

UNIT VII

2. Title: The Search For Energy Affects The Environment

Concept: People and environments are in constant change.

Objective:

To discover the relationship between the search for new energy sources and the effects on the environments - its land, air, water, and living things

Introducing the lesson:

1. Ask the students to show in any way how man's search for energy sources affects the environment.

2. Have each student share the effects shown with class.

Developing the lesson:

1. Draw a picture of people changing the environment to get more energy. (oil, natural gas, wood, coal, electricity)

2. Discuss the changes in your picture.

3. Explore the effects of these changes on people.

4. Design a plan to lessen the effects of man's search for energy.

Extending the lesson:

1. Investigate how man uses energy in the search for more energy. (energy used in exploration)

2. Draw a picture to show how the use of energy affects the environment.

3. Now show the effects on people.

4. Investigate why man's search for new energy sources is getting more difficult. (easy to get sources have been used up. New sources are in harsh climates, deep in the ground or sea, etc.)

5. Add to the class energy word list.

UNIT I

1. Title: A Calorie Count

Concept: Energy comes in many forms.

Objective:

To discover the relationship between food types and the amount of energy they contain

Introducing the lesson:

1. Make a bulletin board display of overweight people doing something, preferably eating.

2. Add some magazine articles or advertisements for programs to lose weight easily or quickly or both.

3. Ask the students to keep a record of everything they eat or drink for a week so they can calculate their calorie intake.

4. Have each student record their weight at the beginning of the week.

Developing the lesson:

1. Determine the definition of a calorie (the amount of heat needed to raise the temperature of one cubic centimeter--one gram--of water one degree Celsius at sea level)

2. Repeat the "nut-burning" demonstration in Lesson 2, Unit II, Grade 4, on page 74, as a means of showing the relationship between food and the production of heat.

3. Ask the students to suggest an investigation to measure the calories in half a walnut. (measure weight of nut and temperature of water before and after burning. How many cubic centimeters of water can you boil with how much walnut?)

4. Determine from a calorie chart the calorie content of:

a. ice cream
b. bananas
c. peanut butter
d. jelly
e. donut
f. cola drink
g. your favorite dessert
h. cookie
i. steak
j. cake and pie

5. Ask, "What is diet cola?"

6. Ask the students to investigate what other foods in their local supermarket are "diet" foods.

7. Ask, "What is the source of calories in a soft drink?"

8. Ask, "What is the substitute "sweetener" in diet foods?" (read the food package labels)

Extending the lesson:

1. At the end of the week, have each student calculate the number of calories per day taken into their bodies.
2. Compare their figures with recommended amounts for sixth graders
3. Compare total calorie intake of students in the class.
4. Identify the "big eaters" and the dieters.
5. Compare the calorie values of regular meals with "snacks".
6. Investigate the role of the Food and Drug Administration regarding materials used in food.
7. Investigate the possible harmful effects of sugar substitutes to human health. Ask, "Why is there a warning label on products which contain saccharine?"
8. Draw a picture of yourself enjoying your favorite meal or snack.
9. Put a funny caption on your picture.
10. Have the students weigh themselves again and compare their weight with their weight at the beginning of this lesson.
11. Start a list of energy words learned in this lesson--an energy vocabulary.
12. Ask the students to use one of the "ENERWORDS" in a story of their eating habits.

Materials:

Food Calorie Chart

UNIT I

2. Title: "Power"

Concept: Energy comes in many forms.

Objective:

To develop a concept of "power"

Introducing the lesson:

1. Ask the students to find photographs or magazine pictures which demonstrate "power".

2. Make a bulletin board display of "power".

Developing the lesson:

1. Ask the students to find examples of different kinds of power--electric power, people power, body power, fast power, slow power, silent power, noisy power, any other kind of power, "me" power.

2. Draw a picture of a friend using power.

3. Put yourself in the picture to change the power being used by your friend.

Extending the lesson:

1. Have students classify the class power pictures, placing them in order from the most powerful to the least powerful.

2. Classify them in another way.

3. Take the class on a field trip to your local electric power plant.

4. Investigate the community use of electric power.

5. Identify the big power users.

6. Write a paragraph describing power.

7. Add to the class energy word list.

UNIT II

1. Title: An Appliance "Energy Chain"

Concept: Energy can be changed from one form to another.

Objective:

To discover the relationship between the appliances they use and the energy needed to produce and operate them

Introducing the lesson:

1. Review the lesson on "food energy chains" (Grade 5, Unit III, page 93).

2. Ask each student to make a list of all the appliances they use.

Developing the lesson:

1. Ask the students to pretend that their favorite appliance is alive and construct an "energy chain" for that appliance similar to a food energy chain.

2. Ask, "Why is it more difficult to construct an energy chain for an appliance than for a food?" (appliances use energy for raw materials, construction, packaging, delivery, as well as use)

Extending the lesson:

1. Construct an energy chain for an object which is not an appliance; for example, an automobile.

2. Compare relative use of energy in the various stages of appliance development and use.

3. Compare energy use for the appliances on the class list.

4. Draw a picture of your life without your favorite appliance.

5. Describe your picture.

6. Write a paragraph describing how your favorite appliance has changed the life-styles of people.

7. Add to the class energy word list.

UNIT II

2. Title: Concentrated Energy

Concept: Energy can be changed from one form to another.

Objective:

To discover the relationship between amounts of energy and the kinds of storage used

Introducing the lesson:

1. Have the students investigate the preparation and use of dehydrated foods by campers and explorers.

2. Ask, "Why did people want to have their food energy sources in a concentrated form?" (weight and bulk, they add water when ready to cook instead of carrying it.)

3. Investigate other methods of food energy concentration for storage. (a cake or candy is concentrated energy)

Developing the lesson:

1. Investigate the process for preparing frozen orange juice concentrate.

2. Ask, "How has the frozen food industry changed the eating habits of people?" (before frozen foods, all fresh foods were available only at the time of harvest. Now strawberries are available all year long.)

3. Investigate other methods of food concentration or preservation for storage. (Dehydration by drying in the sun, salting, or smoking.)

Extending the lesson:

1. Investigate methods of canning.

2. Investigate "old-time" methods of food concentration by explorers, such as "jerky" and "pemmican".

3. Ask, "What was the principal ingredient of these concentrated foods?" (fat)

4. Make a list of the foods you would have to give up if electricity shortages dictated no further use of electricity for freezing.

5. Draw a picture of your family life without your freezer or the freezer in the local supermarket.

6. Describe your picture.

7. Add to the class energy word list.

UNIT III

1. Title: Heat Is Lost

Concept: Energy can be changed from one form to another.

Objective:

To discover the relationship between energy change and loss of heat

Introducing the lesson:

1. Ask the students to find advertisements in newspapers and magazines for products to reduce heat loss in homes, engines, and machines.

2. Make a bulletin board display of the different kinds of advertisements for products designed to reduce heat loss.

Developing the lesson:

1. Ask, "What do we call products which reduce heat loss?" (insulation, lubricants, etc.)

2. Ask, "Where did all this excess heat come from?" (burning of fuels, friction, etc.)

3. Find out if any of the students found an advertisement which claimed to eliminate heat loss entirely. (Look for home insulation advertisements)

4. Investigate the loss of energy (heat) in the operation of an electric power plant (estimated to be as high as 2/3rds of the energy used--coal, oil, nuclear).

Extending the lesson:

1. Invent a way to utilize the wasted heat from an electric power plant.

2. Discuss the reasons why this heat could probably not be used as you suggested. (Power plants too far away from cities to use heat to heat homes or offices; too costly to transport hot water without losing heat from pipes.)

3. Draw a picture of yourself or a friend enjoying wasted heat (warm car in winter, etc.)

4. Investigate the effectiveness of various types of thicknesses of insulation materials for buildings.

5. Invent a way to keep an ice cube from melting in your hand.

6. Have a class contest to see who has invented the best way to keep the ice cube from melting.

7. Compare the melting time with an ice cube left without any covering.

8. Add to the class energy word list.

UNIT III

2. Title: Energy Inventors

Concept: Environments are in constant change.

Objective:

To learn about the inventors and scientists whose work made our high energy society possible and the changes that resulted from their inventions, both to people and to their environment

Introducing the lesson:

1. Read about the inventions of Thomas Alva Edison. (Free booklets available from Florida Power and Light Co.)

2. Ask the students to describe the first light bulb, battery, and power station.

Developing the lesson:

1. Investigate the work of Watt, Volta, Ohm, Ampere, Faraday, Black, Fahrenheit, Celsius, Franklin, Joule, Carnot, Young, Einstein, Fermi, and Galileo.

2. Ask, "Why do some of these names seem familiar?" (many of their inventions were named for them)

3. Ask, "What is a kilowatt?" (1000 watts)

4. Write a letter to Thomas Edison describing the effect that his inventions have had on your life and the life of your community.

Extending the lesson:

1. Read about the work of Henry Ford and John D. Rockefeller in the development of energy and transportation.

2. Ask, "What effect has the automobile and gasoline had on the life styles of people?"

3. Discuss the changes which resulted from other energy inventions and discoveries. (steam engine, nuclear, etc.)

4. Draw a picture of your life without gasoline or electricity.

5. Add to the class energy word list.

UNIT IV

1. Title: The Sun Affects Our Climate

Concept: The sun is the chief source of the earth's energy.

Objective:

To discover the relationship between solar energy and the climates of the world.

Introducing the lesson:

1. Have the students collect advertisements which feature the climate of Florida.
2. Make a bulletin board display of the advertisements.
3. Ask, "What can we learn about the attraction of the climate of Florida on the housing, tourist, fishing, and other industries that might wish to come to Florida?"

Developing the lesson:

1. Investigate the reasons for Florida's warm climate. (geographical location, amount and intensity of the sun, angle of the sun's rays, etc.)
2. Ask, "What does the term "tropical" mean?"
3. Compare the length of daylight and the average yearly temperature of your community in Florida with Chicago, Atlanta, Washington, D. C., and Anchorage, Alaska.
4. Consider other factors which influence Florida's climate which are indirectly related to the radiant energy of the sun. (Gulf stream, warm waters of the Gulf of Mexico, summer showers)

Extending the lesson:

1. Investigate the effects of Florida's warm, sunny climate on:
   a. population--growing rapidly, older than average
   b. tourism--a warm winter vacation place
   c. industry--fishing, housing, agriculture (winter crops)
   d. wildlife--winter home
   e. any other
2. Draw a picture of a tourist enjoying a Florida vacation.

3. Describe your picture, telling how the climate affected the activities shown in your picture.

4. Discuss the harmful effects of the Florida sunshine. (sunburn, skin cancer, etc.)

5. Write a letter to a northern friend telling of the "wonderful climate" of your area of Florida.

6. Have the students design a billboard to be placed along northern highways telling people about Florida's climate and the life styles of people.

7. Add to the class energy word list.

UNIT IV

2. Title: People Worship the Sun

Concept: Solar energy can be used directly.

Objective:

To discover how people throughout the ages have worshipped the sun and its energy

Introducing the lesson:

1. Ask the students to collect pictures of the sun, sunrises, and sunsets.

2. Make a bulletin board display of the pictures.

Developing the lesson:

1. Ask the students to draw a picture which expresses their feelings about the sun.

2. Find examples of modern "sun worship".

3. Ask, "How has modern sun worship affected industries in Florida?" (suntan lotions, retirement, vacations)

Extending the lesson:

1. Investigate the worship of the sun god RA in ancient Egypt. (inscriptions on inside walls of pyramids of Sixth Dynasty--2500 B.C., the "Pyramid Texts", in which the sun god RA carried the Pharoah's soul on his sky boat into the west, where lay the land of the dead)

2. Read in National Geographic magazine for November, 1970 about the restoration of Akhenaton's Temple to Aten the solar disc.

3. Investigate the Akhenaton concept of a single supreme sun god (the solar disc), (the unification of all the former sun gods into one image of Aten. This concept influenced religious thought in the Middle East until the time of Jesus and Muhammed)

4. Read to the class and discuss this passage from the Vedic Hymns (Hindu), circa 1400 B.C.: "And when the Sun arose, they could not understand how this newborn God could wield such power. And they said, "Let us worship this 'Child of Sky'. He stands up as a mighty flame; he stretches wide his arms; he is everywhere like the wind."

5. Investigate this Vedic concept's influence on the writings of Thoreau. (See "Walden", Chapter 2, for insight into Thoreau's regard of the sun as the visible symbol of some yet-to-be-evolved human grandeur. Throughout "Walden", he compares daybreak with spiritual awakening.)

6. Have one of the students read Walt Whitman's "Song of Myself" (a primitive psychological idea that light from an inner sun is emitted through the eyes and mixes with the eternal light of the sun to make visual perception possible--a notion as old as Empedocles (5th Century B.C.)

7. Investigate the "CIWILTKONIA", a sun ceremony of the Papago Indians of the southwestern U.S. (dancers circle a sand painting of the sun and thereby recharge themselves with its life-giving energy)

8. Make up a "CIWILTKONIA" dance.

9. Do it!

10. Read to the class Franz Boas' description of the "Prayer at Sunrise" of the Kwakiutl Indians of the Pacific northwest, and ask the students to discuss: "Welcome, Great Chief, Father, as you come and show yourself this morning. Let nothing evil befall on me this day which you have fashioned according to your wishes, Great One, Walker-Across-The-World, Chief".

11. Draw a picture to express your own feelings about a sunrise.

12. Describe your picture.

13. Add to the class energy word list.

UNIT V

1. Title: Energy For Transportation

Concept: Energy is used to move things.

Objective:

To discover the relationship between energy use and transportation

Introducing the lesson:

1. Take the class out to a place on the school grounds from which they can see a highway.
2. Ask the students to investigate and list what is being transported during a twenty-minute period.

Developing the lesson:

1. Make a class list of what was being transported.
2. Was most of the material being transported locally or from out of state?
3. Ask the students to suggest a way that each material could be moved with less energy.
4. Investigate the relative energy use for trucks and trains in transporting goods.
5. List the advantages and disadvantages of truck and railroad transportation. (speed, delivery, labor, etc.)

Extending the lesson:

1. Investigate people's use of energy for transportation:
   a. needs (basic to survival)
   b. wants (but doesn't need for survival)
   c. dreams (may never get)
2. Ask the students to check their own use of energy for transportation.
3. Draw a picture of your transportation dream.
4. Investigate your community's needs for transportation.
5. Ask, "Why have the railroads declined in popularity?"
6. Compare how cattle are transported today with 100 years ago (driven).
7. Compare transportation in USA with other nations.
8. Add to the class energy list.

UNIT V

2. Title: Energy Use in Other Nations

Concept: People use energy to satisfy their needs

Objective:

To discover the patterns of energy use in other nations

Introducing the lesson:

1. Ask the students to bring in pictures of people's use of energy in other nations.

2. Make a big collage poster for each nation included in the collection of pictures (be prepared to fill in the blanks).

3. Group the "developed" and the "under-developed" nations on the basis of energy use.

Developing the lesson:

1. Consider energy use for basic needs:

   a. cooking
   b. food production
   c. shelter, including heat and light

2. List the nations that use wood as the principal cooking fuel.

3. Do the same for peat, natural gas, coal, oil, electricity.

4. Find places that do their work by:

   a. solar energy (animal and body power)
   b. wind power
   c. water power
   d. electric power
   e. all of these

Extending the lesson:

1. Investigate changes in the life-styles of people in the USA as a result of changes in primary energy sources. (from wood to coal to oil to electric, nuclear, solar)

2. Do the same for people in other places--Eskimo, Arab, Chinese, etc.

3. Predict future changes as oil supplies are depleted.

4. Draw a picture of someone in the midst of changing a life-style as a result of the discovery of a new and unlimited source of energy.

5. Describe your picture to the class.

6. Add to the class energy word list.

UNIT VI

1. Title: A "Do-it-Yourself" Blackout

Concept: Energy supplies are limited.

Objective:

To discover the relationship between life-styles and energy supply availability

Introducing the lesson:

1. Tell the students that you are going to ask them to plan a "do-it-yourself" blackout in your school (no electricity).

2. Ask for suggestions for the class plan.

Developing the lesson:

1. Divide the class into committees to plan parts of the plan. (let the students decide what committees are needed)

2. Have each committee suggest alternative energy sources for heating, lighting, kitchen, etc.

3. Have the committees report to the class for suggestions and approval.

4. Draw up a consensus blackout plan.

5. Get the principal's permission to put your plan into operation.

6. Pull the plug!

Extending the lesson:

1. Develop additional plans to reduce the amount and length of time you must use artificial lighting in in the school.

2. Plan a blackout f[illegible] your home and report back to the class.

3. Draw a picture of yourself before and during the blackout.

4. Describe a school without electricity.

5. Find situations in which you can observe students "blacking out" other students.

6. Explain what is happening.

7. Add to the class energy word list.

UNIT VI

2. Title: A World Without Energy

Concept: Energy is essential for the future of humankind.

Objective:

To discover the relationship between the future of energy supplies and the future of humankind

Introducing the lesson

1. Say: "Some experts predict that, at the presently increasing rate of energy consumption, the world may be out of oil soon after the year 2000 A.D."

2. Ask the students to think of their world without oil.

3. Ask the students to draw a picture of their community on the day the oil supplies run out.

Developing the lesson:

1. Describe your environment without oil and oil products--heating oil, gasoline, lubricants, plastics, fibers.

2. Survey your room at home to see what would be left if you took everything out that was made of synthetic materials.

3. How would that room compare with a room in a pioneer homestead (similar, all wood construction).

Extending the lesson:

1. Now describe a world without wood, coal, natural gas.

2. It has been said that if the U.S. gave the hungry people of the world all the food they needed, they would not have the fuel to cook it. Discuss this situation with the class.

3. Investigate people's search for wood for cooking.

4. Investigate results of people's use of dried animal manure as fuel. (loss of fertilizer to keep soil rich)

5. Ask, "How is man planning for future energy supplies?" (in many cases, the research being done may be too late, as forests are cut down and the deserts of the world spread)

6. Investigate the limits of energy supplies and how they are related:

   a. food
   b. oil
   c. coal
   d. nuclear
   e. solar

7. List the environmental problems of increasing the supplies of each.

8. Add to the class energy word list.

UNIT VII

1. Title: Life-Styles and Energy

Concept: People depend on the environment for their energy.

Objective:

To discover the relationship between energy supplies and standard of living

Introducing the lesson:

1. Ask the students to invent a way to compare the energy demand for the basic needs; the "wants"; and the dreams of people.

2. Ask them to share their inventions with the class.

Developing the lesson:

1. Have the students make an energy formula that measures the differences between people's energy "needs" and energy "wants".

2. Draw a picture to include in a class mural that shows how energy shortages cause changes in societies and the way people live (life-styles).

3. Discuss how such changes in people and societies could lead to conflict.

Extending the lesson:

1. Show how governments and people use energy supplies to make other governments and people do things they want (oil embargo, food exports, etc.).

2. Compare energy needs and wants in the U.S. with those in other nations.

3. Compare different energy needs and life-styles within the U.S.

4. Do the same for your community. (How many private airplanes are there, for example?)

5. Create a dance, a verse for a song, a poem or a picture which shows how we use energy to maintain our life-style or standard of living.

6. Share your creation.

7. Add to the class energy word list.

UNIT VII

2. Title: Energy Waste--Or Conservation?

Concept: Energy can be saved through a program of energy conservation

Objective:

To discover the relationship between energy shortage, waste, and conservation

Introducing the lesson:

1. Take the class on a survey of the school to identify energy waste.
2. Ask each student to quietly list each example seen on the survey.

Developing the lesson:

1. Make a list of all energy waste in the school.
2. Devise a method to eliminate each example of waste listed.
3. Present the list to your principal/custodian.

Extending the lesson:

1. Create a poem, picture, dance, song or whatever, to reveal your feelings about energy waste.
2. Describe the values you hold which cause your "feelings".
3. Survey students' feelings about the "energy crisis".
4. Organize an "Energy Awareness Week" at your school.
5. Create a TV commercial promoting energy conservation in the community.
6. Convert your TV commercial to poster "ads".
7. Use your "ad" to change energy use in your classroom, school, or home.
8. Prove that your posters caused a change in energy waste.
9. Design a sign without words to urge public energy conservation.
10. Design awards--"ENERWARDS"--for people who conserve energy.
11. Do the same for businesses, clubs, etc.
12. Add to the class energy word list.

REVIEW SHEET (K-6)

This teachers' guide, "Energy and My Environment," (K-6) is printed this first time in DRAFT form for your review, field testing and comments. Your evaluation of these lessons will be sincerely appreciated and your suggestions considered for inclusion in our final publication.

Sections of Guide Taught

Grade ____ Unit ____ Lesson ____ Grade ____ Unit ____ Lesson ____

Grade ____ Unit ____ Lesson ____ Grade ____ Unit ____ Lesson ____

Grade ____ Unit ____ Lesson ____ Grade ____ Unit ____ Lesson ____

Are lessons appropriate for grade level? _____

_____

Describe reaction of students. _____

_____

Is there sufficient emphasis on teaching energy facts? _____

_____

Is there sufficient emphasis on teaching values? _____

_____

Your ideas for extending the lessons:

Grade ____ Unit ____ Lesson ____ _____

_____

Grade ____ Unit ____ Lesson ____ _____

_____

Grade ____ Unit ____ Lesson ____ _____

_____

Please put additional ideas on back of review sheet; include the grade, unit and lesson numbers.

Other comments and suggestions: _____

_____

_____

Reviewer: _____

Title or Position: _____

Address: _____

School: _____ County: _____

Phone Number: ( ) _____

Return this review sheet to: Rosalyn B. Tillis
Energy Education Coordinator
Governor's Energy Office
The Capitol
Tallahassee, Florida 32301